The Veterinary Record.

FOUNDED BY WILLIAM HUNTING, F.R.C.V.S., 1888.

No. 52 DECEMBER 26, 1931. VOL. 11.

(1) Observations on the Tuberculosis Order. (2) Some Interesting Cases and Methods of Treatment.*

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It is with the greatest diffidence that I make this attempt to provide some material for discussion at this meeting, but I thought it would be of interest to chronicle some interesting cases and methods of treatment preceding them by some remarks on the Bovine Tuberculosis Order in general, and a record of many mistakes which I have made in carrying out its provisions.

First of all, I shall make a few remarks regarding the Bovine Tuberculosis Order, our salaries and duties, and suggestions as to making useful changes in the provisions of that Order. The question of the miserable salary meted out to many of us—part-time veterinary inspectors—presents itself. Judged from the point of view of amount of salary, the duties should be light: if we dealt with it as it really deserves, I am afraid they would be still lighter. At the time of the change in remuneration from scale of fees to fixed salary, I fought hard to have the former retained. Under that scheme there was an incentive to efficiency, and the inspector went about with a live interest. The change came, but the work remained, and we had to make the best of a bad job.

To the framing of the Order I have no intention of making allusion, except to say that there should be some scheme of inspection of suspected animals—long before they come within the provisions of the present Tuberculosis Order. Let me give an example:—The farmer has a cow coughing in the autumn, and during the winter. The cough remains, but the owner does not think seriously of it. It is only when that animal is put out for the summer, and loses condition, and becomes an indifferent feeder that the owner suspects tuberculosis. Had he access to a veterinary inspector in the early stages (at least clinically) of the malady, the source of infection would have been limited, and the spread of the disease kept in check. I have had a case lately of such a kind as I have stated above. The cow was fed out of the same trough with her neighbour all the winter and spring. I slaughtered her this summer, and she proved to be the worst case of open tuberculosis with which I have ever met. Her neighbour of the winter has a very bad cough and is rapidly losing condition: she will be a case for me in a few months—at present I cannot deal with her. Think of all the harm that has been done by the first cow emitting tubercle bacilli broadcast for about nine months! If her owner had the means at hand to diagnose the condition early, something practical would have been achieved towards limiting the spread of the disease. This is a matter worthy of serious thought for those in authority. As at present constituted, the Bovine Tuberculosis Order helps only in a very, very small way towards the checking, much less the eradication, of tuberculosis.

I will not touch on the question of compensation, more than to say that this also needs alteration—such as a flat rate. What does the farmer know about "advanced" or "not advanced" in regard to *post-mortem* findings? All he is concerned with is how much he is getting out of the transaction. The veterinary inspector values the animal; the farmer agrees, and signs the form—he is rather pleased, in many instances. The *post-mortem* takes place, a form is put into his hands giving the result, and he is informed that he is only entitled to the legal fraction. Why should there be any differentiation so far as compensation is concerned? In my view, half should be paid for disease, and the usual amount where no tuberculosis is found on *post-mortem*. If the owner were dealt with in this way there would be an incentive to report cases, and we should then see something attained towards the object for which the Order was framed. So much for the Order, and the question of early inspection; and basis of compensation.

Now to the troubles of the part-time veterinary inspector, who is expected conscientiously to carry out its provisions without hope of even making his expenses in a great many cases. I mention the part-time man because I know that the whole-time officer can go about his work wholeheartedly and leisurely: he has the necessary appliances at hand to carry out his examinations properly and efficiently. When the part-time inspector starts to deal with a case he must of necessity exclude all questions of personal inconvenience, and feeling of a grievance on account of poor remuneration. It is, I must confess, hard to do this, and personally I must say I have found it difficult to take a keen interest in the work. One is inclined to be casual and make cursory examinations—to justify such by the thought that it is quite good enough for the niggardly remuneration. If mistakes occur, let the public funds pay—serve them right! This feeling will help to explain some of the mistakes which I have made. Perhaps mine is an isolated case of incompleteness, in the large army of part-time inspectors dealing with this so-called effort towards the eradication of tuberculosis among bovines in this country. Be this as it may, the recital of a few blunders may be of some service to the novice, and perhaps, to the old hand as well. I take them at random.

(1) Swelling of all the superficial lymphatic glands in an undersized bullock of one and a half years in only poor condition, and a temperature of 105° F. *Post-mortem* revealed no trace of tuberculosis. The laboratory informed me that the condition was of the nature of Addison's disease.

*Paper presented to the Veterinary Medical Association of Ireland at the Royal Veterinary College of Ireland, Dublin, August 4th, 1931. Received for publication November 16th.

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(2) Heifer, aged four years. History told of intermittent illness during previous one and a half years. The owner could never get her to feed well in the house; at times she refused all food; sometimes she developed a cough, with accelerated respirations, and appeared to be sore all over her body. For short intervals she appeared quite normal, but on exposure to the slightest variations of weather a change occurred. The owner, a poor man, had a very detailed and minute history of her condition for me. When I first examined her, I found nothing definite to lead me to suspect the presence of tuberculosis. The temperature was 103° F.; there were occasional rigors, and evidence was present of a very slight pleural rub on both sides. Her appetite and physical condition were very poor, but there was nothing more definite. I promised to call again in a fortnight. My second examination revealed an absence of the abnormal pleural symptoms; the general condition was similar to that obtaining at my previous examination; temperature about 102° F. As the weather was favourable I advised that she should be let out on the pasture daily. The owner promised to report progress in 10 days. That report was not at all favourable: heifer not grazing, just topping the herbage; at times her sight seemed to be impaired—an inclination to walk into the bog drains on her way to and from her pasture. I saw her again, and certainly she was very much worse—practically emaciated in condition, with a cough and a definite return of the pleurisy. This question of the abnormality in the pleural cavity was very disconcerting: I could always get a bronchial roughness, but I did not attach much importance to it. The temperature I found 103° F. The poor general condition weighed most heavily with me, also the variations in temperature. I never once seriously considered the use of the subcutaneous tuberculin test—I had seen her often enough and the diagnosis was abdominal tuberculosis, probably extending to the chest by way of the serous membranes. She was slaughtered, when I found the lungs free from any chronic affection, merely a simple pleurisy with fibrinous exudate of the pleura covering the anterior border of the ribs on both sides of the chest. There was no abnormality in the abdominal organs or glands, with the exception of the liver. There was a cirrhosis of very old standing, with distomata in goodly numbers.

(3) Cow aged about 15 years in very poor condition: chronic cough, appetite indifferent. A large young family was dependent upon her for its milk supply. She had been in this state of health for about twelve months. Clinical examination revealed a chronic bronchitis, the deeper parts of the lungs not being aerated: temperature 103° F. On account of her history, and the fact that the children were in the habit of playing in the stable where she was tied, and that they were solely dependent on her to supply them with milk, I decided to slaughter. *Post-mortem* examination was negative for tuberculosis. The only chronic waster abnormality was in the liver—two large abscesses.

I cite these three cases as indicative of the class of case we meet with occasionally. One is puzzled and although there is a degree of doubt, yet the circumstances have a determining effect, such as in case number three.

(4) I now come to the condition which we find on *post-mortem* examination to be one of so-called chronic broncho-pneumonia. There is no tuberculosis—at least macroscopically—the lesions present being more or less emphysema of both lungs, and a hepatised condition of their lower borders, the depth of this latter condition being as a general rule about two inches. Cutting into it is like cutting a very old cirrhotic liver. The walls of the bronchioles involved are calcareous in most instances, and their contents thick, muco-purulent and welling up on section into the area. There is no enlargement of the lymphatics, and nothing abnormal in the abdominal contents. I have put the *post-mortem* appearances first, possibly because they have left a very vivid and lasting impression on my mind.

On looking over my tuberculosis case diary I find that I have examined (not necessarily slaughtered) all ages and conditions of animals affected with this condition which should be called pulmonary emphysema, as the result of some old trouble such as chronic broncho-pneumonia, in the calf of four months to the cow aged 14 years. The subject in many cases is very much smaller than normal, usually pot-bellied, and in poor condition. The appetite is good; respirations are shallow and greatly accelerated, especially after slight exercise. A cough is the general rule, husky and high pitched in tone. One case, a cow of 14 years, a shorthorn pigmy, had a "draw" (as the owner described it) since she was a yearling. She developed a cough about 10 days before my visit and as it had no tendency to disappear, he was anxious to know whether she was suffering from tuberculosis. He had never heard her cough up to that time. She had bred regularly and had fine healthy calves. She was never in a saleable condition in her young days—that was the owner's reason for keeping her. He bred from her, and she turned out very remunerative. She was always a good milker.

I have observed the condition in an animal almost ready for the butcher; in a calf, a pure bred Aberdeen Angus—four months old. It had had a long railway journey with its mother after purchase two months earlier, and apparently contracted a chill *en route*. A bronchitis developed, which would not clear up; treatment was of no avail. I saw him several times during the following eight months, as a matter of interest. I tested him intradermally, with negative result. He died at twelve months, and I made a *post-mortem* examination, with findings typical of this condition.

I often wonder why the powers that be have not modified the provisions of the Bovine Tuberculosis Order in regard to using the tuberculin test in pulmonary cases. For the information of those who are not administering the Order, I may be allowed to explain that as the Order stands, we are not allowed to submit to the tuberculin test any animal which is, or appears to be, suffering from a chronic cough or showing definite clinical symptoms of tuberculosis. It is easy to see that 90 per cent. of the mistakes automatically would not occur were this part of the Order deleted. For the past year I have taken the law into my own hands, and used the intradermal test on all suspected animals, where I had any doubt at all. It was one way of becoming proficient in carrying out this most useful form of tuberculin test. It has not let me down yet; even in what proved on *post-mortem* to be very advanced cases the local reaction was diagnostic—a well-defined, diffuse, sensitive swelling. Some years

ago I used the hypodermic test, with positive result, on a case of chronic pulmonary trouble which turned out, on *post-mortem*, to be chronic broncho-pneumonia. No macroscopic lesion could be found. Cases are reported to me, or met with in private practice, where an animal which had not been doing as well as its fellows, and had sometimes shown a tendency to blow, is found to have developed a very distressing cough, with respiration very much accelerated, appetite quiescent or very poor, temperature 104° to 106° F., with abnormal sounds all over the lungs, wheezings, cracklings, bronchial râles, rubs as if pleuritic—dull areas not generally found. After auscultation of both lungs, if one repeats the examination, the areas of abnormal sounds often will have shifted their position. Experience shows that in chronic pneumonia due to tuberculosis it is the absence of sounds, the dull areas, which count; in the other condition the sounds are exaggerated, and in re-examining, remind one of shifting sands. Getting samples of expectorate, for microscopical examination, has always proved a very difficult matter for me, though I know some inspectors who can get the sputum easily.

The ophthalmic test, used in conjunction with either form of testing, has never given uniformly useful results, in my experience. Some of my listeners will doubtless shrug their shoulders and say that no one could mistake chronic broncho-pneumonia for tuberculosis, but I submit that there are cases which are most puzzling. Certainly without the use of the intradermal test some border-line cases would prove very unsatisfactory from the diagnostic point of view. These "border-line" cases are what I now believe to be old moderate cases of pulmonary emphysema coupled with areas of chronic broncho-pneumonia, where an acute chill has supervened with rise in temperature to 105° F. or 106° F., and symptoms of severe pulmonary lesions simulating tuberculosis. The symptoms do not abate in these cases and the animal wastes. I have never seen such a case revert to its old "passive resistance" state. I should say, before leaving the subject, that during the past five years I have met with about twenty cases of this chronic condition, some of which appeared to be really pulmonary emphysema—symptoms of dyspnœa being present after meals, and gradually disappearing as the animal became empty. Most of these cases have been heifers in their seventh or eighth month of pregnancy.

(5) On looking through my "mistakes" cases, I find two of diaphragmatic or mediastinal hernia, the reticulum being firmly adherent to the edges of the hernial opening. The first case was in an aged cow. Symptoms: chronic tympany of the rumen, general unthriftiness. I applied the tuberculin test with negative result, and put her under treatment, but without effect. In six months the owner reported that the cow was much worse in every way, having developed a cough, and he was afraid of his family getting the disease. I called and examined my patient. My examination did not leave me at all satisfied that tuberculosis was present. The general condition was much worse, temperature 103-6° F.; there was a bronchitis and frequent cough; the tympany was as bad as before. Taking everything into consideration, I decided to slaughter and the result was as just stated.

The second case was a two-years-old heifer in a moribund condition on my visit. The case looked absolutely one of tuberculosis, with enlarged mediastinal glands. *Post-mortem* examination revealed the condition exactly similar to the first case.

(6) The word "moribund" reminds me of two other cases. One was under the old régime, where I found a typical case of Johne's disease in a bullock 12 years of age. He was moribund and I slaughtered him.

(7) The second case was one of pyelo-nephritis and chronic endometritis with thickening of the walls of the uterus. This cow was in a very advanced state of emaciation, was lying practically unconscious, with just spasmodic contractions and extensions of the limbs in the last stages of uræmia. There was also diarrhœa. *Post-mortem* was as stated.

These cases were encountered some years ago, when I had not much experience of the work. Now I do not deal with such cases at all—and it is a good rule to adopt: leave the moribund case severely alone.

I must apologise for taking up so much of your time with this confession. I had intended to refer only to chronic broncho-pneumonia, but on looking through my Tuberculosis Order diaries I thought it might interest you to hear of these cases. The subject of the frequent occurrence of the chronic pulmonary trouble in cattle has not been touched upon in any of our professional periodicals of late, and I shall be interested to hear from the members present their experience of this condition. Needless to say, treatment is useless.

Enough of tuberculosis!

Fatal Post-Castration Illness in Colts.

I wish to refer next to some cases of fatal post-castration illness in colts, seven in number, which have occurred sporadically in my practice during the past 20 years. They were operated upon by me under general anæsthesia. The symptoms were exactly similar in all cases. After five or six days the colt was noticed to be lazy, and not inclined to keep up with the others. I saw the patient usually about the tenth day. He had a tucked-up appearance, no swellings round the castration wounds, no temperature (or very slight rise), appetite very poor, gradually becoming a minus quantity. There was no pain whatever. He had no inclination to move unless forced. From day to day the condition became worse: he virtually melted away and died in from 16 to 22 days after operation. Treatment was of no avail. Hypodermics of strychnine and pilocarpine, tonics and stimulant electuaries of varying strengths, dimol—all resulted in failure. On only one colt did I make a *post-mortem* examination, when the only important lesion I found was verminous aneurism and thrombosis of the anterior mesenteric artery. This colt was insured: hence the *post-mortem*. These cases happened at an extremely busy season of the year, and it was impossible to given them as much attention as one would like. All were half-breds or draughts, in good condition.

I make a point of taking a good look at colts before operation. If they are very poor and scraggy-looking I put them back until the autumn; and some of these had recovered so little that even then I did them standing. I had an idea that they might be affected similarly to the unfortunates whose trouble I have just recounted.

The symptoms I have described would never lead one to suspect the presence of a verminous aneurism. The wall of the artery was greatly thickened and there were

numerous parasites present, and considerable clotting. The lumen, however, was not occluded, nor was there marked interference with the blood supply to the bowels. What was the cause of the trouble? Even a process of elimination brings us no nearer to it. The animals were in good condition apparently; they were not thrown violently as in the case of the use of ropes, without chloroform. The operation was uneventful. There was no swelling afterwards. They simply faded away.

I have often had the good intention of mentioning these cases at one of our meetings, but when one does not make a written note, the subject is forgotten, and only when another case crops up is the matter forcibly brought back to mind. This spring I had my last case—a yearling pony. I only heard about it by chance from a neighbour of the owner, but he described the case, and his description tallied in every detail with that of the others. One client had two fine draught colts castrated by me in 1916. Both became affected and died.

I have never heard of, or read about, the condition I have just described, and I look forward with great interest to hearing whether my experience is unique. Surely such could not be the case. I have watched our periodicals for years, in the hope of seeing some note on the subject, but all in vain.

An adapted chloroform muzzle.—While speaking about castration I may be permitted to draw your attention to the muzzle which I use. It is an ordinary Cox's muzzle, altered to suit my requirements. The muzzle is large enough to fit over the mouth and nose, making it easy to adjust on the colt. The body of the muzzle is encased in aluminium rivetted to the leather. This prevents the leather cylinder from becoming soft, as often happens when one is castrating a number of colts in the same place, or going from place to place all day, when the leather becomes softened, and the muzzle lies heavily on the nostrils, pressing on them unduly, and sometimes causing alarming dyspnœa. The aluminium casing eliminates that failing; and there is then no trouble.

Restraint.—The only means of restraint I carry are two stoutly-made straps. These I strap round the crossed legs of each side, when the animal has been pulled on his back. This takes only a few seconds, and I think it is always a great advantage to have a colt on his back for castration. The field of operation is fully exposed and the inguinal canal can be easily explored if an undescended testicle has to be looked for. Also, if there is hæmorrhage after removal of the emasculator, the cord can be picked up with comparative ease, and crushed again, or the artery ligatured. I have on one occasion put the latest type of Haussman and Dunn Emasculator on a bleeding cord three times, and still could not stop the hæmorrhage, until I used a ligature. I always carry a supply of sterilised gut for the purpose.

I have also here what I consider a very nice adaptation of the "Zip" fastener to a chloroform muzzle. Mr. Elphick, of Newcastle-on-Tyne, very kindly had this made for me. It arrived late for my castration season, and it has yet to be tried by me.

Prolapsus Uteri.

For some time I have been using a general anæsthetic in replacing prolapsed uterus in cows: it renders the operation as simple as ABC. The patient gets 1½ ounces to 2 ounces of chloroform, and goes off very quickly, and without much excitement. Of course, I put her down with hobbles, and wash and clear up the uterus before giving the anæsthetic. The hind part is raised up on a tightly-filled sack of straw, placed under the hind part, and the uterus slips back with ridiculous ease.

I have been told of another method which is very successful. When the cow has been got on to her feet, the uterus having been cleaned up as much as possible, the latter is placed on a fairly wide board and raised above the level of the vulva. With very slight effort the organ is then replaced. Instead of manual replacement of the horns, this method calls for a copious supply of cold water introduced into the vagina by the two hands from a bucket held in position. No notice is taken of what becomes of the water—it is not syphoned out, or interfered with in any way. This procedure causes no uneasiness to the recipient, and no vulva sutures, or restraining appliances are needed. I was about to say that I almost looked forward with pleasure to giving this method a trial on my next case of prolapsus uteri—but who could mention the word "pleasure" in connection with such a condition? The successful use of the method will give me the greatest possible pleasure, I can assure you.

Some Minor Operations in Cattle.

The removal of supernumerary teats from the udders of heifers and cows is an operation I am called upon very frequently to perform, and I cannot speak too highly of the efficiency of the old pattern of H. and D. emasculator in this connection. The selection of a means of restraint is important: often the victims are in an advanced stage of pregnancy, and throwing with any of the recognised methods sometimes causes abortion. In a recent issue of a very instructive paper called the *Jensal Journal*, published monthly, and distributed free of charge to veterinary surgeons by the Jensen-Salsbery Corporation, of Kansas City, I found described a simple, and yet very effective means of restraint for minor operations in cattle, namely, the turning up of the tail. One hand (either left or right according to the failings of the individual assistant) is placed round the root of the tail and used as a fulcrum, while the other hand grasps it about a foot lower, and forces it up towards the back. The sharper the leverage, the greater the effect. It acts in the same manner as a twitch in the case of the horse. I have removed two and, in some cases, three supernumerary teats from the same udder, without a wince from the animal. I find this raising of the tail most useful in examining and treating injuries in the region of the foot. The latter can easily be raised and examined.

As our old friend Ovid once said—"Necessity is the mother of invention." One morning lately I was in a quandary as to how I should remove some pedunculated tumours which were causing no small respiratory "deglutitial" trouble to a bovine patient. They were situated on the posterior surface of the soft palate, and I could not remove them manually. I was a long way from home, and it would have been an unprofitable proposition to suggest to my client a second visit. On joggling my scattered cranial elements, it suddenly dawned on me to try "binder twine." It is made of very tough fibre, as you know, and is not easily affected or softened by saliva or any other liquid. Fortunately, this twine is at

hand in almost all farmhouses, so the required article was soon at hand. I made a slip-knot, and introduced it into the pharynx, and with a little manipulation, placed it on the pedicle of the tumour and pulled the free end. The rest was easy; it removed the tumour beautifully. Of course, I kept my hand in close contact with the tumour during the process. I repeated the same routine with equal success on the other growths. Some months previously I had a similar operation to perform, and employed an elaborate mechanism for its performance. The binder twine revolutionised the treatment, and I am now willing to sell to any interested party, the old collection of scrap-iron tubing and Bowden wire. These were both cases of actino-bacillosis; and have done well with internal treatment. Other small tumours were present in each case, which could not be removed: these have apparently disappeared. The animals are relieved of all distress, and have returned to their normal health and condition.

Miscellanea.

Perhaps someone here will be kind enough to give me a 100 per cent., or even 80 per cent., successful prescription for intratracheal injection for parasitic bronchitis. I find that what acts like magic on one calf (and that a very bad case) will not effect a cure in a more lightly affected one.

Of course, during the wet autumn of 1930 the affection took very heavy toll of the calf population of the country, but even in normal seasons I find this, what I might term, discrepancy in the effectiveness of intratracheal injections.

I am also anxious to hear the experience of those who have used the Laidlaw and Dunkin vaccine virus method of immunisation against distemper. Personally, I have used in all my patients, except one, the double dose of vaccine. My last patient got the vaccine-virus treatment and with anything but a smooth course. The subject, a red setter dog, one year old, became very ill about four days after receiving the dose of virus, and I had great difficulty in saving his life: I got a rare fright. I thought that I had a subject most suitable for my first trial of the vaccine virus method. Now I am asked to use one of the methods on ten greyhounds—nine of which are three months, and one 12 months old. I have heard that greyhounds are bad subjects for this method, and Mr. Dalling recommends its use. So what am I to do?

When I first jotted down a few headings for piecing together these notes, I included "Istin" or "Istizin" as it was formerly called. It is a Bayer product, and has, I am sure, been widely used by our profession. It is a brown powder without odour or taste, and unsoluble in water. It is a purgative suitable for all animals. Its formula—a 1 to 8 dioxanthraquinone—does not get us very far. Be that as it may, "Istin" is extremely useful in practice. I prescribe it for all animals at times. It is the safest purgative I have ever used. It is practically non-toxic, and an over-dose does not produce alarming symptoms. It does its work, so to speak, silently and well. I give ʒii to ʒvi in capsule to horses, about the same doses to cattle with, when necessary, a hypodermic of arecoline hydrobrom. gr. ii. For pigs it is just wonderful, on account of its ease of administration: place the dose of powder by means of a spoon on the tongue by pulling the lower lip to one side. A very small quantity of cold water poured into the mouth after it will cause the pig to move the tongue, make swallowing movements, and the powder finds it way backwards gradually. I have used it a great deal in bovine erysipelas.

My last remarks will be an act of homage to the memory of Professor Bier. I never tire of singing his praises: only last week I saw the recovery completed of one of the worst and most neglected cases of septic open hock joint with which I have ever had to deal. The joint had been growing for a fortnight; the limb was a huge size, and the mare in a deplorable state generally. I applied my magic elastic band, as usual, and in a fortnight the joint had ceased to discharge. A large eminence of granulation tissue remained. The mare was still only able to point the toe to the ground. Five days later I had her put out to graze for a few hours every evening. By the way, in this form of treatment I have found in old cases of quittor that treatment is useless unless the animal is restricted in its movements, that is, kept in the stable. I have, on a former occasion, given details of a number of cases successfully treated by this method, including even poll-evil. I will not record them now, but if any member would like a demonstration, I shall give it with pleasure. The only "doubting Thomas" I have met—and he is very honest about it—is our worthy President, and perhaps even he has now been converted.

Before I sit down, I should like to refer to a condition with which I have met in the mare after foaling which has not been mentioned in some recent papers on the subject. I allude to rupture of the entire wall of the vagina a little anterior to the meatus urinarius, and the eversion of the torn posterior portion. In my first case the condition did not give the patient much trouble, except when she was unable to urinate owing to occlusion of the meatus. This case, on cleansing and replacement, remained in position and caused no further trouble. The second and only other case I have ever met with was more troublesome. The everted portion was not retained on replacement. The use of the vulva clamp did not succeed, and eventually I was obliged to amputate the everted portion of the vagina: then all went well.

I have had many cases of pyometra in the mare: one where a thoroughbred mare had violent colic. She was presumed to be in foal four months. Rectal examination revealed a uterus of enormous size, which was the cause of the symptoms. I am sure that, after dilating the os, I syphoned off about 30 gallons of fœtid purulent material. That uterus, of course, filled again, but only sufficiently for the owner successfully to offer her for sale at Sewell's the following spring, and make a sale of a great old brood mare, presumably heavy with foal.

If I have been of any assistance to fellow practitioners in the retailing of a few cases, and matters of interest, I shall feel fully recompensed for the disturbance of my ordinary routine of life which the writing of these notes has entailed; and if my confession of my troubles as a part-time officer in dealing with the Bovine Tuberculosis Order is of some service to those in a position similar to mine, I shall indeed be pleased.

Let me say this much in conclusion—it is no easy matter for anyone who has a busy practice to find time to practise the concentration of thought requisite for the piecing together of notes on cases, while I must apologise frankly for the topsy-turvy way in which I have dealt with the tuberculosis section of this paper.

Discussion.

Mr. R. O'Donnell said that the difficulty in diagnosing tuberculosis in certain cases must remain, but that it did not affect materially the working of the Tuberculosis Order. In some instances prolapse of the uterus was very troublesome to deal with.

Mr. L. Magee observed that he found binder twine very useful for removal of tumours by applying it in the form of a noose round the tumour. He had an extensive experience of snoring in cattle. When called to a case he examined the nose by passing his fingers up the nostrils in search for a foreign body such as a piece of stick. He examined the mouth and pharynx thoroughly by the aid of a gag and manipulated the soft palate. In a recent case with which he had to deal he found nothing after exploration in the manner described. There was considerable dyspnœa and he inserted a temporary tracheotomy tube. The operation was rendered somewhat difficult by the fact that there was œdema to the depth of two inches of the tissues in the neck. He then explored the interior of the larynx and a tumour therein. He applied a noose of binder twine around it and by this means pulled the greater part of the tumour away. The remaining thickening was removed by a course of potassium iodide and the patient made a complete recovery.

In another case there was a large tumour in the roof of the pharynx. He pulled away one half of it, causing profuse hæmorrhage. The animal then stopped breathing and he cut two or three rings of the trachea to prevent asphyxia and sent for a temporary tube to insert in the opening. In the meantime, he performed artificial respiration which caused the natural breathing to return. After putting in the tube the beast got up and he then removed the other half of the tumour.

He had found the Bier treatment very successful in a case of open navicular bursa. Chloroform had proved a great boon to him in dealing with prolapse of the uterus, but even with chloroform it was sometimes impossible to effect reduction of the organ when its cavity was filled with coils of intestine. In one case of this kind he opened the uterus with a view to pushing back the bowel, but failed in the attempt and was obliged to destroy the beast. He had been twice successful with amputation of the uterus in the cow and once in the sow, in which the organ had been prolapsed for two days. He could not offer any explanation of the cause of the death of the two colts after castration. He had castrated two horses recently with the Burdizzo Castrator—one being a four-year-old and the other a three-year-old. He had no trouble in using the instrument. One month after operation the testes had reduced to half their normal size and the horses were put into training within one week after the operation. He was sure the operation would be more difficult in a yearling.

Mr. P. F. Dolan spoke of the weak points of the Tuberculosis Order and said that tuberculous cows had done all the harm of which they were capable before coming under the scope of the Order. For cows in the last stage of tuberculosis the compensation paid to owners was insignificant. There were plenty of wasted cows not suffering from tuberculosis: many of them were merely affected with broncho-pneumonia. The tuberculin test was not always helpful. Examination of the sputum was always necessary to arrive at a diagnosis. There were some cases of miliary tuberculosis in cattle which showed no symptoms during life. Examination of the chest was of little value in the diagnosis of tuberculosis. In many cases it was better to make a mistaken diagnosis than to waste money in ensuring a correct diagnosis. The present Tuberculosis Order would never go within a thousand miles of eradicating tuberculosis.

Mr. F. S. Ringwood complained that when specimens of diseased organs were sent to the Department there was no reply given as to whether the specimens contained lesions of tuberculosis, so that the veterinary surgeon was sometimes in doubt as to the accuracy of his diagnosis.

He had found epidural anæsthesia very useful in dealing with prolapse of the uterus in the cow. He would like to hear the experiences of other members of the vaccination of dogs against distemper: he found that it was not a success with foxhounds, as some of the dogs got distemper and died after it.

Mr. J. F. Healy said that when he met with an advanced case under the Tuberculosis Order he advised the owner to send the beast to the kennel, as he did not consider any good purpose was served by returning a report concerning it. In cases of snoring in cattle where there was a doubt as to the nature of the obstruction in the pharynx, he made a puncture with a trocar and canula from the outside. When the condition was an abscess pus escaped through the instrument: he then incised the swelling to evacuate its contents.

Mr. J. D. Whitty spoke of the efficient way in which most of the temporary inspectors under the Department carried out their duties under the Tuberculosis Order. He agreed with Mr. Mulcahy as to the highly contagious nature of tuberculosis and of the necessity of thorough disinfection of infected premises.

He considered that the remuneration of the temporary veterinary inspectors was totally inadequate, especially when one considered that this work involved the prosperity of the country and the health of the people.

Lesions of broncho-pneumonia were often confounded with tuberculosis under the Tuberculosis Order. Cirrhosis of the liver and abscesses and cysts were sometimes diagnosed as tuberculosis.

Mr. S. Conway said that if the compensation were less than £4 owners would rather lose the animals than be troubled with the Tuberculosis Order. The forms to be filled under the Order could be greatly simplified and thereby save the veterinary officers a great deal of trouble. With regard to hoose in calves, he had no faith in intratracheal injection but had marked success by drenching the animals with a preparation of which he gave the ingredients.

Mr. O'Leary expressed the opinion that snoring in cattle was due, in 95 per cent. of cases, to tuberculosis.

Regarding distemper in the dog, he was never successful in preventing the disease by the injection of serum and virus, but had a certain amount of success with the other injection. He preferred chloral hydrate to chloroform in connection with the reduction of the prolapsed uterus. He had a case of calves which were affected with a film on the cornea of both eyes after coming a journey by train and they were still opaque 10 weeks after their arrival. He had some cases of footrot in cattle which were very obstinate to treatment.

Mr. Kirkpatrick (Johannesburgh) gave an interesting account of his experiences in South Africa. Tuberculosis was very rare amongst the cattle in that country: the butchers had a system of insurance whereby they were indemnified against loss in the purchase of animals which were condemned after slaughter by the Meat Inspector.

He had had many cases of bog spavin in mules in which the lameness appeared suddenly. The animal might be perfectly sound at night and be found in the morning on three legs. With suitable treatment they became sound in six weeks, and the condition seldom recurred. He had seen much tuberculosis in pigs which were not fed on milk, but on offal from the companies.

Anthrax was not so common now as formerly—vaccination had proved very successful. At one time it was very prevalent, however; he had seen 40 animals ill at the same time with temperatures ranging from 107° to 109° F. Most of them recovered. When anthrax was suspected in a carcass the spleen was exposed and examined at once and if it was found enlarged smears were taken immediately.

Mr. M. J. McClancy referred to the difficulty in diagnosing tuberculosis in some cases and spoke of the clinical symptoms of the disease.

The Reply.

Mr. McCann said, in the course of his reply, that until this year he never had a case of a cow suffering from prolapse of the uterus which died from shock. He had a case in a heifer cow five days after calving: the

The Bacterial Contamination of Milk and its Significance.*

Harold Burrow, M.R.C.V.S., D.V.S.M.

When one contemplates the wide scope of the subject of this paper and the immense importance of its bearing on public health, one realises that the most one can attempt in the limited space at one's disposal is to construct a rough framework of thought around which the many diverse interests present at this Congress may build a finished story.

Only under what one may term " laboratory conditions " is milk *withdrawn* from the udder in a sterile condition and we come to look upon a certain bacterial content of milk as normal and unavoidable.

It is convenient to divide the consideration of the contamination of milk into two main parts :—

(1) Contamination by organisms which, so far as we know, are not pathogenic to man.

(2) Contamination by organisms which either are, or are suspected of being, pathogenic to man.

Contamination of Milk by Non-Pathogenic Organisms.

Chief among the non-pathogenic contaminants are lactic-acid-producing organisms, spore-bearing bacteria, bacteria causing abnormal conditions in milk, and yeasts and moulds. Micrococci, *Streptococcus lacticus, B. coli,* and *B. ærogenes* form the principal members of the acid-producing group, the first-named, according to Heineman[1], accounting for 75-90 per cent. of the total bacterial flora. To these must be added the saprophytic acid-fast group, including the hay, " mist " and dung bacilli and numerous ubiquitous organisms whose identity has yet to be established. It is generally accepted that organisms of the Coli-ærogenes group are of intestinal origin and find their way into milk from dung, bedding, etc., while the acid-producing organisms are derived chiefly from such " outside " sources, but in part also from the udder itself. Streptococci and micrococci are ubiquitous in distribution, and dust from the cowshed, hairs and filth from the animal's coat and udder, foreign matter from milkers' hands, from strainers, coolers, bottles, cans, refrigerators, etc., all add their quota to the general contamination. The effect upon the milk produced by the presence of these non-pathogenic " saprophytes " is, in brief, a progressive alteration in the character of the milk, terminating in putrefaction. Up to a point, the deciding factors in the rate at which these changes proceed are :—(1) the intensity of the contamination of the milk, and (2) the temperature at which the milk is maintained. High bacterial content together with favourable temperature for bacterial growth, which latter in the case of most organisms circles around body-heat, are the optimum conditions for early and rapid decomposition. However, *Streptococcus lacticus* grows well at low temperatures and 45° F. is necessary in order to restrain the activity of this organism for a reasonable time.

Spore-bearing organisms, including Proteus, *B. putrificus, B. welchii,* etc., make poor progress in milk and multiplication is limited. Heineman[2] observes :—" As a rule, spore-bearing bacteria are not of material sanitary significance in milk and their chances of growth are relatively poor, since milk is constantly in contact with air and contains appreciable quantities of oxygen in solution." Chromogenic organisms (Sarcina, *B. prodigiosus, B. cyanogenes, B. fluorescens, B. erythogenes*) and those producing slimy, ropy, bitter and soapy milk, etc., are generally of external origin, arising from bedding, fæces, stagnant ponds, etc., and are significant only as sources of economic loss, altering the physical characters of the milk in such a way as to render it unsaleable. Their occurrence in milk is exceptional, and as they have little significance purely from the point of view of public health they need not be further discussed here. The sum total of the effect of the so-called saprophytes in milk is, in a word, to render a perishable article even more perishable. From this angle they are a by no means negligible source of economic loss to the producer, the distributor, and the consumer. From another angle, they are to be regarded as an indication of the efficiency or otherwise of the whole train of operations entailed in conveying milk from the udder of the cow to the mouth of the consumer. While the saprophytes we have mentioned are in themselves to be ragarded as harmless from the point of view of the health of the consumer, nevertheless, excessive numbers indicate carelessness and lack of method and of cleanliness in production, and such carelessness is in almost every case responsible also for the presence in milk of pathogenic organisms. The less the degree of contamination of milk by saprophytes, the less is the risk of its contamination by pathogenic organisms.

The remedy against undue bacterial contamination of milk is obviously to prevent their access : to deliver to the consumer a product as nearly identical bacteriologically as possible with that which leaves the udder of the cow. The keynote in clean milk production is firstly " method," secondly " method," and lastly " method." Esten and Mason[3] showed that the exterior of the cow is the most prolific source of bacteria in milk, the surroundings (shed, utensils, etc.) coming second, and the udder itself contributing least to the contamination. They state the relative sources :—udder 4 per cent., surface of animal 70 per cent., other sources (including utensils) 26 per cent. of total contamination. Russel and Hastings[4] showed that while milk from a clean, moist udder might contain 115 organisms per c.c., milk from the same udder, not cleaned, might have a bacterial content of 3,250 organisms per c.c. Again, Stocking[5] showed that by using a covered pail the bacterial count could be reduced from 33,150 organisms per c.c. to 1,740 organisms per c.c. The subject of clean

*Paper presented to the Veterinary Hygiene Section of the Royal Sanitary Institute Congress, Glasgow, on July 10th, 1931. Reproduced from *The Journal of the Royal Sanitary Institute*, December, 1931 : Vol. lii, No. 6.

organ was out all night in the frost and he failed to return it. He mentioned a case of œdema of the soft palate in an ox causing dyspnœa for which he inserted a tracheotomy tube, but when he took the tube out the rings collapsed and he was obliged to re-insert the tube and leave it in position.

Mr. McCann showed an improved muzzle for the administration of chloroform, and concluded by speaking in eulogistic terms of the effects of the Bier treatment for chronic septic lesions in the limbs.

milk production is a field which the limits of this paper cannot embrace, but one ventures to sum up the main points by saying:—"A clean, healthy cow; a clean, healthy milker using clean utensils; cleanly surroundings and handling at every stage in the transit of milk from cow to consumer, constitute the essentials to a milk supply possessing the minimum bacterial contamination." By this word "clean" we mean "surgically clean"—as near an approach to absolute sterility as is practicably possible.

Contamination of Milk by Pathogenic Organisms and Organisms suspected of being Pathogenic.

When one considers the huge quantity of milk consumed daily, much of it in a raw, unheated and untreated state, one is struck by the sparseness of milk-borne epidemics, apart, of course, from tuberculosis.

When the source of the milk-supply to the persons affected by a milk-borne epidemic is traced it is generally found to lead to the premises of one particular distributor, where either a sufferer from the disease in question, or in some cases a "carrier" (diphtheria, typhoid) may be discovered. At other times, however, no such patient or "carrier" may be connected with the distribution of the milk, and the search must be continued to the farm or farms where the particular supply is produced, and medical examination must be directed towards all persons who have handled the supply or who may have had direct or indirect access to the supply. The tracing of the sources of milk-borne epidemics is a process of elimination, and reliance is placed on circumstantial rather than on direct evidence. It is an accepted fact that pathogenic organisms do not multiply to any extent in milk, and in milk-borne infections not derived from the cow herself the number of pathogenic organisms in the supply is so small as to render direct demonstration microscopically, biologically, or culturally a tedious and inconclusive process. The several diseases which may be the originators of milk-borne epidemics may conveniently be divided into two classes:—

(1) Diseases peculiar to humans alone.

(2) Diseases of primary origin in dairy cows but to which humans also are, or are suspected of being, susceptible.

Milk-Borne Epidemics of Diseases Peculiar to Man.

Typhoid Fever.

Typhoid fever shares with diphtheria the "honours" of being the most frequent subject of milk-borne epidemics. The sources of outbreaks of typhoid fever are either active cases of the disease, "carrier" individuals, or persons who are merely "external carriers," conveying the bacilli on clothing, hands, etc., after contact with one of the former. It is recognised that fæces and urine of both patients and "carriers" are the chief sources of bacilli, and uncleanly habits on the part of these classes of individuals very easily lead to contamination of milk handled by them. Flies may convey the bacilli from privies, middens, etc., where fæces and/or urine of such patients or carriers are disposed of, and gaining access to milk, dairies, and milk utensils, may infect that particular supply. Domestic animals (dogs, cats, etc.) after contact with disease carriers or their excretions may passively carry the contagion to milk receptacles. Rain-water may wash bacilli from the above sources into ponds, shallow wells, etc., when, if water from these sources be used in connection with the dairy, contamination of the milk supply may follow. Inefficient sanitation, faulty and leaking drainage systems, etc., may in a similar manner pollute water supplies used for dairy purposes.

In the investigation of typhoid epidemics believed to be milk-borne, one's attention must be directed to the possibility of a case or "carrier" on the premises of either the distributor or producer. Should such a person not be discovered, one must survey the general sanitary conditions of the dairies concerned, paying special attention to the possibility of contagion from polluted water supply used in and about the dairy. Medical examination of all persons connected either directly or indirectly with the handling of the milk and scrutiny of the hygiene of the dairy coupled, when necessary, with bacteriological examination of the water supply, are the lines along which investigation should proceed.

Paratyphoid and Dysentery.

Milk-borne epidemics of these two diseases are much less common than those of typhoid fever. As in the case of typhoid, the chief sources of infection are the patient and the "carrier," and fæces and urine are the chief sources of the responsible organisms. Sources and causes of contamination of the milk supply are similar to those cited in the case of typhoid, and similar lines of investigation are indicated in dealing with all three diseases. The milk-borne epidemic of paratyphoid recently reported from the Epping district (February, 1931), in which over 100 cases of the disease occurred and seven deaths resulted, showed that the source of contagion was a milker suffering from the disease and passing on the organisms to the milk handled by him.

Diphtheria.

Diphtheria shares with typhoid the notoriety of being the most frequent of the milk-borne epidemics. Here again, the disease may originate from patients, "carriers," or "external carriers"; the latter including small domestic pets. Dogs and cats, although themselves immune to the Klebs-Lœffler bacillus, may act as passive carriers by transporting the bacilli from human cases and contaminating milk containers to which they gain access. As the oral, nasal and pharyngeal secretions of the patient or "carriers," as well as the expired air, may be sources of contagion, contamination of the milk handled by such persons is obviously more easily effected than in the case of typhoid, paratyphoid, etc., in which the bacilli are excreted chiefly in the fæces and urine. Infected milkers may contaminate the supply by coughing or sneezing over the pail while milking or by expectorating on their hands during the milking process. Milk stored in open churns in a room in which there is an infected person may become polluted from the air of the room into which such a person breathes. The hands of an infected person may become contaminated from the mouth, nose, or handkerchief, and may carry the bacilli to utensils subsequently handled. As in the case of typhoid, the lines of investigation of milk-borne diphtheria outbreaks are towards the detection of cases or "carriers" who may have had access to the supply, and of other persons who, while not themselves either cases or "carriers," may have carried the contagion to milk from contact with those sources of bacilli.

Scarlet Fever.

Hæmolytic streptococci, generally associated with this disease, gain access to milk from persons actually affected with the disease or from persons who have been in contact with such patients. The organisms appear to persist tenaciously, and while "carriers" analogous to typhoid or diphtheria "carriers" do not exist, nevertheless the organisms can exist in a virulent state apart from the patient for some considerable time. Taylor[6] records an outbreak of scarlet fever in Lewes in November, 1928, in which twenty-six persons were involved. The origin was traced to a farm, where it was found that, although no cases had occurred among the personnel of the farm, the two children of one of the cowmen who lived some distance from the farm had suffered attacks of scarlet fever two months previously. It was considered that contagion had reached the milk *via* the clothing of this cowman, the bacilli having remained virulent during the interval of time between the cases occurring in his home and the contamination of the milk supply at the farm. The methods of tracking down the primary origin of milk-borne epidemics of scarlet fever do not differ materially from the methods indicated in the case of other diseases—detection of cases and in-contacts and their segregation, puts an end to the milk-borne contagion.

Asiatic Cholera.

According to Heineman, milk-borne epidemics of this disease are rare. Fæces derived from human patients are the chief source of bacilli, and uncleanly habits and bad sanitation may permit of their access to the milk; but the spirilla die rapidly in milk and "carriers" of the disease are said to be rare.

Septic Sore Throat.

Much speculation and argument have centred round the origin of the streptococci associated with this condition in certain cases. Some claim that the streptococci associated with septic sore throat are entirely of human origin and have no connection with streptococci of bovine origin (mastitis cases) and that whenever a milk-borne epidemic of the disease occurs it originates from an earlier case in some person or persons. Others have cast grave suspicion upon the case of bovine mastitis as the source of the trouble, and hold that streptococci from bovine sources can exert pathogenicity for humans. At the present moment we must regard the matter as undecided, and entirely *sub judice*. Davis and Smith[7] say:—"The streptococci of cow mastitis are different from streptococci of human tonsilitis; virulent streptococci of man do not cause any appreciable inflammation of the cow's udder: mastitis streptococci do not cause affections to man." Lane-Claypon[8] asserts:—"How far such streptococci (from mastitis cases) may be pathogenic for the human species has not as yet been accurately determined, and it is likely that such a determination is hardly possible." She claims that outbreaks in America of septic sore throat have been traced to streptococci in cows' milk, but gives no proof that they originated from the cows' *udders*.

It seems peculiar that although mastitis is rife in the herds of this and most countries, the numbers of outbreaks of septic sore throat traceable to milk supplies are insignificant. It has been held that only the hæmolytic strains of streptococci are likely to be pathogenic to man. Minett, Stableforth and Edwards[9], investigating the bacterial flora in 113 cases of bovine mastitis (taken at random), found the following types:—Streptococci, 82; Staphylococci, 6; *B. pyogenes*, 21; Gram-negative bacteria, 3; *B. necrosis*, 1. Of the 82 streptococci infections, 52 were found to be due to hæmolytic strains and 30 to non-hæmolytic strains. If these samples may be taken as an index of the prevalence of hæmolytic streptococci in cases of mastitis, then one can but assume that a large percentage of milk supplies must contain hæmolytic streptococci; and if hæmolytic streptococci of bovine origin are in fact pathogenic to humans, one has difficulty in understanding why our milk supplies are not a *constant* source of epidemics in humans. It may be that streptococci of bovine origin may prove pathogenic to humans under certain conditions as yet not definitely determined.

Human Tuberculosis.

While it is possible for tubercle bacilli of human type to be spread *via* milk from phthisical persons employed at farms and dairies, especially if the objectionable habit of expectorating on the hand during the so-called "wet" milking process is resorted to, cases definitely proved to have risen by this means are lacking in the literature. It is necessary, however, for the sanitarian to keep such a possibility in mind when tracing the source of tubercle bacilli in milk.

Diseases of Primary Origin in Dairy Cows.

Human Tuberculosis of Bovine Origin.

The most serious and the most constantly present pathogenic organism in general milk supplies is the bovine tubercle bacillus. The source of bovine tubercle bacilli in milk is, of course, primarily the cow suffering from tuberculosis of the udder either in its early or advanced stages; but contamination of milk by sputum coughed into the cowshed by the animal suffering from disintegrating lesions of tuberculosis in the lungs or by tubercle-infected fæces from the animal suffering from tuberculous intestinal ulceration may, and one is convinced does, occur. A glance at the percentage of tubercle-infected milk samples taken in our large towns and cities makes it no exaggeration to say that at least six per cent. of all milk supplies in large towns is infected with tubercle bacilli; indeed, in some towns the percentage has been shown to be more than double that figure. The pathogenicity of the bovine tubercle bacillus for the human race, more especially for the human infant, need not be elaborated upon here. The question we naturally ask is, "How can this dissemination of bovine bacilli *via* milk be stopped, or if complete arrest is impossible, how can it be reduced to an absolute minimum?" The only answer that suggests itself is, "By periodic and frequent examination of all milk-producing animals, checked by repeated and frequent biologic examination of all milk coming into our towns and cities." By systematically testing the milk supplies of dealers in rotation one can clear up infection in each supply at least temporarily, and by repeated and continual testing one can cut short the *continuance* of such infection. It is generally held that *repeated* doses of tubercle bacilli are most dangerous to the consumer, especially the young children. In the present state of knowledge we have no alternative to the biological test

in the examination of *bulk* samples for tubercle bacilli. Having received a positive result, inspection and close and careful clinical examination of all dairy stock on the farm concerned must be carried out immediately. Clinical cases of tuberculous mastitis are dealt with by immediate slaughter. Individual samples of milk are taken from cows which show indurations of one or more quarters not definitely referable to previous attacks of mastitis, injuries, etc. The individual samples should in every case be submitted to a careful microscopical examination. Only when microscopical examination proves negative, and when one's clinical experience suggests strongly that the induration of the udder is suggestive of tuberculosis and cannot otherwise be adequately accounted for, should recourse be made to the biological test for samples from *individual cows*.

Until the happy day arrives when State finance and public opinion are both equal to the task of commencing the campaign for the eradication of bovine tuberculosis our vigilance must be directed towards impeding the spread of tuberculosis both from cow to human and from cow to cow.

Contagious Bovine Abortion (Bang's Disease).

The similarity morphologically, culturally and serologically between *B. abortus* and the *Micrococcus melitensis*, the latter having for years been recognised as the cause of undulant fever in humans, has led to a suspicion that *B. abortus* also may be a cause of undulant fever. The several points of similarity which are common to Malta fever in goats and abortion in cattle, and more especially the fact that in the case of both diseases bacilli are excreted copiously *via* the milk, led to closer scrutiny of the rôle of *B. abortus*, and at the moment the dairy cow stands in peril of being inculpated as a party in the spread of undulant fever in humans. As regards the abortion bacillus, it is known that it may be present in an animal without causing that animal to show the characteristic symptom of the disease—abortion or premature expulsion of the fœtus, *i.e.*, cows may be " carriers " of the abortion bacillus just as there are human diphtheria " carriers " who themselves fail to surrender to the attack of the bacillus. Moreover, cows which harbour *B. abortus* in their bodies often excrete the bacilli copiously *via* the milk. Heineman found *B. abortus* in cows' milk up to 50,000 per c.c. The udder appears to be the reservoir for abortion bacilli in the " carrier " cow, and cows may carry and excrete in their milk abortion bacilli without ever showing any clinical signs of the affection. Agglutination tests which have been carried out in different districts suggest that a large percentage of cows are " carriers " of the organism. Much evidence has been gathered to show that undulant fever in man may be caused through ingestion of the *B. abortus* in milk from cows which harbour and excrete the organism. Cotton[10] remarks :—" While the strains of bovine *B. abortus* usually found in milk may have a very low pathogenicity for man, it is possible that some aberrant strain much more virulent for him may sometimes be found in it. Unusual types of the micro-organism have actually been isolated from the udders of cows in several instances." Further he observes :—" It is far too early to predict the significance of *B. abortus* to human health. We are confronted with a newly-found danger which we as yet poorly understand. We have reason to hope that it is not a serious one, but we do not know." During the last two years cases of undulant fever in man alleged to be due to consumption of cows' milk infected with *B. abortus* have mounted up rapidly. It seems that such milk is likely to cause infection of the human, either when the resistance of the particular person is particularly low, or when the strain of bacillus involved possesses some enhanced pathogenicity. The question of the causation of undulant fever in man as a result of ingestion of *B. abortus* in cows' milk is, like the question of the rôle of the streptococci in milk, still a matter for further research and for the moment must be left an open question.

Bovine Mastitis.

The question of streptococcic sore throat in humans and the responsibility of organisms from cases of bovine mastitis was mentioned in dealing with the human complaint. Of other organisms associated with mastitis—*B. pyogenes*, Staphylococci, etc.—little notice has been taken from the point of view of human health, and details of cases of illness in humans directly referable to those organisms borne in milk are lacking. Nevertheless we appreciate the fact that organisms not generally pathogenic for a particular species may assume pathogenicity under conditions not fully understood, and, for the sake of safety if not delicacy, it would appear prudent to exclude from the milk supply all milk from acute cases of mastitis from whatever bacterial action resulting.

Anthrax.

Though it is recognised that anthrax bacilli may be excreted in the milk of the affected cow immediately prior to death, such transmission to humans is hardly likely to occur, as milk secretion decreases almost to vanishing point at the onset of the extreme fever associated with the disease. In the majority of cases the progress of the disease in bovines is extremely rapid, occupying but a few hours. It sometimes happens, however, that on farms where a fatal case of anthrax has occurred one or more animals show high temperature and malaise—the so-called " anthrax fever." These appear to be " abortive " cases of the disease, and it is prudent to reject the milk from all cows showing abnormal rise in temperature on premises where fatal cases of anthrax have recently occurred.

Foot-and-Mouth Disease.

Milk from cows suffering from foot-and-mouth disease may give rise in humans to severe gastro-intestinal disturbance similar to that occurring in calves fed on milk from the same source. Cases of such transmission to humans have been reported from the Continent, where foot-and-mouth disease is more enzootic and where measures of supervision and control are scarcely so rapid and effective as those practised in this country.

Actinomycosis.

Actinomycosis of the mammary glands of the cow is a somewhat rare condition. The " ray fungus " may, however, become located in the udder as a result of the use of cereal straws as " milking tubes," the fungus being commonly present on cereals. Actinomycotic granules in milk can only take root in the body of the consumer when they find entrance into some raw "wound" —a vacated and raw tooth cavity or a fresh ulcer in the

alimentary tract. Although no records are available of human actinomycosis of bovine origin conveyed *via* milk, the possibility remains, and actinomycosis of the udder, if diagnosed, condemns the affected cow as a milk-producing animal. Recent work on the subject of actinomycosis is inclined to discount the "ray fungus" as the cause of this condition and points to staphylococci as associated organisms.

Variola Vaccinia (Cow-Pox).

Cow-pox being due to what may be regarded as a much-attenuated form of the virus of smallpox (in humans), cannot give rise to that disease should the milk supply become contaminated with virus from vesicles or pustules occurring on the udder and/or teats of affected dairy cows. In the case of vaccinated persons consuming milk contaminated with the virus of cow-pox ill-effects are not likely to result, but in the case of unvaccinated persons, especially young children, entry of the virus into an abraded mucous membrane of the digestive tract may give rise to malaise and some degree of pyrexia similar to the condition seen in infants for some little time following vaccination. Milk from cows suffering from cow-pox in its active stages, *i.e.*, during the periods of vesication, pustulation, and ulceration, should not be used for human consumption.

Wounds, Sores, Ulcers, etc., on Udder and/or Teats of Dairy Cows.

The chief of these conditions are barb-wire cuts, treads, "chaps," blisters, cow-pox ulcers and abrasions. The importance of such raw unhealed sites on the udder or teats is that they may form a "nidus" for organisms pathogenic to man. Howard-Jones[11] describes a case in which active *B. diphtheriæ* were cultivated from swabs taken from raw cow-pox ulcers on the teats of two cows—the bacilli having lodged there from the hands of an infected milker. Such sores, by reason of their uneven surface and their vascularity, provide an admirable nesting-place for organisms originating from disease-carrying humans; these organisms escaping into the milk during the manipulations of the teats by the milkers at subsequent milkings. All cows suffering from open wounds or sores on udder or teats should either be excluded from the milking-herd until healing is complete or special precautions should be taken to keep such wounds surgically clean.

Food Poisoning from Consumption of Milk.

Cases of alleged food poisoning following consumption of milk have from time to time been reported, chiefly from the Continent. These cases have been attributed to the consumption of milk from cows suffering from intestinal disorders due to the *B. enteritidis* of Gärtner (one of the principal causes of food poisoning), which reached the milk *via* fæces splashed therein. It is recognised that *B. enteritidis* is a normal inhabitant of the rat's intestine, and one ventures the suggestion that contamination of feeding stuffs with the fæces of rats may be a cause of certain gastro-intestinal disturbances in cattle. Similarly, contamination of milking utensils by rats may be a source of the bacillus in milk. Furthermore, Van Oijen[12] suggests that certain strains of *B. coli* in milk may produce a heat-stable toxin which may produce gastro-intestinal disturbances in children drinking milk contaminated with those particular strains of *B. coli*, even after pasteurisation has been carried out. Ramsay and Tracey (Illinois University, New York) claim that *Staphylococcus aureus* in milk may produce outbreaks of food poisoning.

The above notes, admittedly touching merely the fringe of the vast subject of Bacterial Contamination of Milk, are offered as suggestions for the lines along which a discussion on this important problem of the sanitarian might profitably be carried on.

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Discussion.

Mr. J. N. Ritchie (Midlothian) said that general bacteriological count tests for coliform content and chemical analysis of milk were the chief guides to its quality. The quality of graded milks had been regulated, but unfortunately milk, or ordinary milk, had no standard of cleanliness. Certainly they had the Milk and Dairies Acts and dairy by-laws which, if properly observed by producers, would ensure a milk supply at least up to "Grade A" standard, but the fact remained that a large number of producers still supplied a dirty milk. Clean milk competitions had helped to improve matters, and similarly had voluntary schemes for the counting of bacteria in ordinary milk supplies, but in these schemes they usually found the producers who were progressive and whose milk was already reasonably clean. White, in a paper on purchasing milk on a quality basis, referred to a system adopted by the Midland Counties Dairy of Birmingham; in that system the milk of each producer was tested periodically, and the results of all tests were sent to all producers. A bonus was paid to the producers who occupied the 36 highest places on the list. The benefit of the scheme was well shown by the figures for the two years 1922 and 1927. In 1922, 4·9 per cent. of producers had milk with a count less than 10,000 bacteria per c.c., in 1927 the percentage was 59 per cent.; in 1922, 54·5 per cent. had milk containing less than 200,000 bacteria per c.c., and in 1927 this figure rose to 94·1 per cent. When one realised that the milk industry was in a none too flourishing state, one wondered if it would not be possible for more of the bigger distributing agencies to test the milk they bought and to pay a bonus to those producers who were selling them a good clean article of food. That would both help the producer and improve the quality of supplies.

The labour question was undoubtedly one of great moment to the dairyman. He found it often difficult to get good milkers, probably because it required a good deal of common sense to understand clean milk production and because anyone with common sense chose work which was not so exacting. More and more producers were installing milking machines to overcome that difficulty. In the hands of a producer who understood the working, cleaning, and sterilising of the machine, one might safely say that the milking machine was at least an improvement on indifferent hand-milking, if it could not replace good hand-milking. In the hands of a producer ignorant of the working of the machine and its cleaning, there was no doubt that the machine became a most fruitful source of bacterial contamination of milk.

Mr. Burrow had said that the general bacteriological count of milk was of great importance, as indicating

(besides the general cleanliness and efficiency of the method of production) the likelihood of contamination with organisms which were harmful to man. However, they could read the result of the test more widely than that. It was a great help to the public health worker who was directly interested in the health of the cows. Generally, after a producer had reached a fairly high standard of efficiency there came a time when the general bacteriological count of his milk maintained a more or less constant level. When that stage had been reached a high count of bacteria should be particularly noted, as it would often indicate that organisms were being contributed to the milk directly from the cows themselves. A sudden high count was particularly worthy of attention in high-grade herds where the general level was low and where the higher was still below the prescribed maximum. Here an examination of the cows would often be rewarded by finding a cow with mastitis, etc.

The coliform test was also taken as an indicator of cleanliness. Fæcal contamination was chiefly blamed, but faulty sterilisation of utensils was probably more often the cause. The test was most important when it was realised that fæcal contamination might also add tubercle bacilli and other organisms which were pathogenic to man. He mentioned a particular case where coliform organisms were persistently present in a bulk supply. The usual sources of such contamination were explored (particular attention was paid to the cleanliness of the cows, the washing of the udders, udder cloths; sterilisation was found to be efficient, and the water was also tested and proved to be pure). The coliforms still persisted in the supply. Samples of milk from groups of cows were taken, and subsequently the milk from individual cows in the offending groups. Thus the source of the coliforms was proved to be from two cows, and in each of these from one quarter of the udder. That was of interest, because it showed that coliform organisms in milk did not *always* arise either from fæcal or any other contamination, and because on clinical examination no abnormality was found in the udders, and in the absence of the coliform test the cows would have been allowed to remain in the herd indefinitely. It was of passing interest to note that the udder of one of the cows, which was kept till she calved, still harboured abundant coliforms in the next lactation and still appeared to be perfectly normal.

Tuberculous mastitis had been mentioned, and was certainly important; its frequency was surely one of the chief arguments for the establishment of more and more tubercle-free herds, if not for an effort to eradicate tuberculosis completely from bovines. The large number of bulk samples of milk which contained tubercle bacilli rendered this subject important to all public health workers; when they realised that unless pasteurisation was highly efficient the organism was not destroyed, it became more important, and it became still more important if they investigated individual cases and found that cows may be voiding tubercle bacilli in their milk some three months before definite clinical evidence of disease was found in the udder.

Dr. Gerald Leighton (Edinburgh) referred briefly to two points in connection with the subject. The first was a criticism which he was sure Mr. Burrow would excuse, because it was not directed against him or his paper, but against the present nomenclature of the subject. At the end of the paper Mr. Burrow referred to cases of food-poisoning associated with milk. His criticism and his plea was that the term "food-poisoning" should not be used in connection with those cases at all. It was very misleading to the public. If they were due to the cause suggested in the paper, those cases should be described as gastritis, enteritis, or gastro-enteritis, which was what they actually were. They were simply milk-borne infections, and as such should be so mentioned.

The second matter was one which had given him considerable thought during the past two or three years, in which time it happened to have been his duty to scan very closely the bacteriological examinations of a very large number of milk samples. The samples had been from graded, ordinary, and pasteurised milks. He had been astonished and rather disturbed to find what a large proportion of the samples gave the coliform reaction. They were usually taught to believe that that reaction was associated with contamination of the milk from manurial sources, and also that it was associated with a very high bacterial count. He was beginning to doubt whether either of those statements was always true. In fact, he knew that the latter was not. There were a certain number of samples which gave a coliform reaction where the general bacterial count was not at all high. Moreover, quite a number of the coliform reacting samples were found in pasteurised milk. One was almost driven to the conclusion, first of all, that there might be possible contamination of that sort after the milk was pasteurised, though from what source he was not prepared to say. And the other conclusion to which one was being driven was that the presence of the reaction in milk was probably not such a serious thing from the point of view of danger to the consumer as one used to think. He would suggest that the coliform reaction in milk was worthy of further research as soon as possible.

Dr. J. A. Fairer (Leicestershire) stated that he first undertook the bacteriological investigation of milk whilst in the Navy in 1915, and he had a scheme for the routine bacteriological inspection of the milk supplied in both the rural and urban districts of his county.

In addition, the Leicestershire school children were being supplied with approximately 50,000 penny (one-third pint) bottles of milk weekly, and bacteriological "surprise" samples were picked up regularly to maintain the purity of supply.

A recent advance had been the supply of milk to a local ironworks, which commenced with a supply of 90 gallons a week a year ago and had now increased to 160 gallons per week. That the ironworkers appreciated the milk could be illustrated by the fact that four men leaving work and seeing three dozen penny bottles standing, consumed the lot between them, on the principle of "You have one with me."

He felt that as a county medical officer of health his duty was to see that milk should come clean from the cow. Some large distributors were promoting that by giving a bonus according to the result of bacteriological examination. He felt, however, that much could be done by education. There was firstly the education of the farmer as to cleanliness of production, and he stated that considerable advance had been made in the last few years, his farmers themselves now taking a lively interest in the result of bacteriological examinations. Some years ago they were unable to read correctly the reports sent to them of a bacteriological examination, and in one case there was a discussion as to whether the report "uncountable" was indicative of good or bad milk. However, he felt that most of the farmers were ready and willing to learn, and had certainly improved their knowledge and as a result the condition of their milk production.

He felt that the veterinary surgeons knew all about milk production, and in his county the majority of his sanitary inspectors had already attended an intensive course on clean milk production at an agricultural college.

A further point was the education of the people so that they should know something about clean milk and how it was produced. They would then insist on a cleaner supply.

Children in his elementary schools were being supplied in most cases with "Grade A" milk, and they heard this term used with beneficial results. At the same time he deplored numerous designations given to milk, and quoted one child who, when questioned as to "certified" milk, answered that it was milk sent to lunatic asylums.

He opposed the designations which had been suggested of A, B, C, and D milk.

There was also the education of the medical officers of health and general practitioners; many were definitely interested, but some, he thought, might take greater concern in the matter.

He himself would like only two standards of milk—milk and good milk—and no bad milk. The good milk should be of the present standard of certified milk, and should be labelled "Grade A (T.T.)." That meant that the present "Grade A" producers should advance a step farther, and that the authorities should assist them financially to attain that end.

With reference to the rest of the milk, nothing less than the present "Grade A" standard should be allowed, not only as delivered to the householder, but as delivered to the pasteurising plants. The housewife could ask her retailer for "graded milk" or "ordinary milk," and would then be allowed of the latter to choose which she liked, raw milk or pasteurised.

With reference to milk below that "Grade A" standard, he would suggest that three warnings should be given to the producer, and if after that the standard of present "Grade A" was not maintained, he should not be allowed to sell milk for human consumption. He might, however, send it to manufacturers who made use of surplus milk to produce electric light standards, fixtures for bathrooms, buttons, etc. A farmer producing dirty milk would have the assurance that if his milk was converted into trouser buttons he was at least supporting home industries.

He felt sure that if all worked together with one common object the milk supply for the country would, as it was now doing, steadily improve. In any case, the public ought to have clean milk; and this was present in the udder of the *healthy* cow. The human agency was the connecting link between the cow and the consumer. If, therefore, milk was not clean the fault lay there between the cow and the consumer, *i.e.*, with the producer and the retailer. That was how he saw it, and his sole object was to help the farmers, many of whom were his personal friends, to supply a highly desirable and necessary commodity in a clean state.

Mr. W. Tweed (Sheffield) complimented Mr. Burrow on his paper, and said that the cow was often at the mercy of man, and particularly so in regard to housing in badly-ventilated cowsheds, which was very conducive to the spread of tuberculosis amongst them.

One often heard reference made to the amount of tuberculous infection of milk sampled throughout the country, and it must be remembered that in estimating the true percentage of tuberculous infection in an area, the percentage of cows giving tuberculous milk should be obtained by taking a number of cows giving tuberculous infection as compared with the total number of cows whose milk was examined. That represented the true infection of the milk in that area.

If the total milk supply of a city were being examined and the samples were taken from the mixed milk of individual herds, the percentage of infected samples was much lower than when the mixed samples taken comprised the mixed milk of a large number of cows or several herds. Therefore, the percentage was variable according to the number of cows whose milk was included in the sample, and that fact should not be overlooked.

By the spread of efforts to obtain tubercle-free herds and more routine veterinary inspection of all dairy cows, the percentage of cows giving infected milk would be kept low, but while the extent of infection in their herds remained as it was to-day, they must expect to find the same percentage of cows giving tuberculous milk developing year by year.

Therefore all means possible to free dairy herds from tubercle infection should receive state encouragement.

It was also becoming desirable that milk should be bottled on the farms, and when cooled and bottled in that way, it not only assisted in delivery, but eliminated many sources of contamination until consumed.

Dr. J. H. Clarke (Scunthorpe) said there were many points arising out of the comprehensive paper by Mr. Burrow which were of practical significance to the epidemiologist.

During the past 50 years a notable decline had occurred in the frequency of milk-borne enteric fever in this country. Such outbreaks were said to be common in the United States. Milk-borne epidemics of scarlet fever were more frequent than milk-borne diphtheria outbreaks. Although large outbreaks of all three diseases were recorded, milk-borne scarlet fever epidemics were usually more extensive as to numbers and area than milk-borne epidemics of diphtheria.

In a recent series of 96 epidemics tabulated by Godfrey, the average number of cases per epidemic worked out approximately at 65 for scarlet fever, 65 for diphtheria, and 14 for enteric fever. (One very large outbreak of 400 cases considerably augmented the average for diphtheria.) The relative importance of scarlet fever as a cause of milk-borne outbreaks was a reflection of the greater prevalence of scarlet fever in the community.

The unrecorded frequency of milk-borne disease had had little or no attention until recently. There were good grounds for supposing that many outbreaks in the past, especially small ones, had been missed altogether. In 1922 one was able to show that an epidemic of scarlet fever occurring in Edinburgh had been preceded by two small outbreaks, undetectable by ordinary methods.

The diagnosis and control of milk-borne epidemics were based upon an incomplete knowledge of the bacteriology of milk, the natural history of the infecting organism, the manner in which the persons exposed react to infection, and on an intimate knowledge of the ramifications of the milk trade.

Diagnosis was at present chiefly influenced by the fact that milk infection followed the milk cart. There was a milk supply common to most or all of the affected cases. That factor, and the general characteristics of milk-borne epidemics, helped to trace the source of infection. In the elucidation of milk-borne outbreaks various errors and difficulties might arise to obscure the issue. Moreover, the infecting case or carrier could not always be detected. In 15 out of 32 outbreaks of milk-borne diphtheria, occurring chiefly in England, from 1879-1921, no definite source of infection could be traced.

Early diagnosis of an outbreak of milk-borne scarlet fever or diphtheria was essential for the early removal of the cause. Early diagnosis could be materially facilitated by observing the change in the age-incidence of milk-borne scarlet fever and diphtheria. The method of diagnosis by a high adult incidence occurring in those outbreaks originated in Edinburgh, and had recently been shown by Godfrey to hold good in the United States. By using that method it should be practicable to bring milk-borne scarlet fever and diphtheria epidemics more quickly under control, and to throw further light upon the prevalence of these milk-borne diseases.

In practice, the prevention of milk-borne epidemics might be a matter of considerable difficulty. There was no doubt, as indicated by Rosenau and other authorities, that milk-borne epidemics might occur in spite of the observance of apparently adequate precautions. Pathogenic streptococci, for instance, had been shown to occur in "certified milk," and an epidemic of diphtheria was on record as spread by "certified milk."

In the process of milk production it was practically impossible to exclude carriers or mild and unrecognised cases of infectious disease. The larger the milk supply, the greater was the risk of infection occurring. As a rule, however, the larger producers and distributors of milk took all possible precautions to prevent infection. There was probably no certain method of preventing such outbreaks short of sterilisation of milk after it reached the hands of the public.

Dr. C. Leonard Williams (Barking) said the one thing to which he would call the attention of the conference was the fact that there was much milk sold to-day which had been pasteurised and which was sold as ordinary milk.

Because this milk was sold as ordinary milk, it was difficult to complain of it unless the bacterial count was greater than that which was allowed in Grade A milks, whereas in reality it should conform to the standard laid down for pasteurisation.

It was obvious that if it did not conform to the standard laid down for pasteurised milk it could not be looked upon

as reasonably safe, and Dr. Williams hoped that the conference would insist that all milk which had been pasteurised should be sold as such, and that no milk should be subjected to any similar process which fell short of official pasteurisation.

With reference to the *B. coli* count, if this were not due to contamination with filth, it was difficult to understand to what it was due, and the most common filth to give a high *B. coli* count was, it could only be assumed, dung. The complaints, therefore, that such milk was diluted sewage were very difficult to refute, and the amount of milk imported into London with a high *B. coli* count showed the unsatisfactory nature of the milk supplied.

Dr. Bertram Hill (Selby) said there was a necessity for some legislation prohibiting the sale of milk in bottles unless the milk was a " designated " milk. It frequently occurred that in the same area milk was being sold in bottles by different firms—the one being a designated milk, the other not, and by this means the public was being deluded, for the fact that the milk was in bottle led the public to think that it was a superior class of milk, when it might be anything but superior.

Dr. Roper Saunders (Rowley Regis) said that bottles should be of approved type, with wide mouths and with fresh caps each day, capable of proper cleaning.

Milk was sold in the Black Country in narrow-necked bottles, with attached stoppers and rubber seating, and incapable of being properly cleaned.

Moreover, *sterilised* milk was sold, owing to the appreciation of the danger of untreated milk; this was dangerous to young children and should be discouraged, being replaced by *pasteurised* milk.

Alderman W. Muirhead (Liverpool) said they had heard a great deal about various designations of milk, but so long as they allowed a low quality of tinned condensed milk to be sold, they were beating the air. They knew the craze for cheapness among many women, and to promote the health of the poorer classes of children the sale of such stuff must be forbidden, for although it was labelled, " not to be used for children," that was useless.

Dr. C. S. Thomson (Belfast) said that in their efforts to obtain a pure milk supply they should not antagonise the farmer. They should work with him; explain in a kindly way what they wanted him to do; give a prize for the best milk in the district; stimulate the public interest in clean milk, and so force up the standard.

Dr. C. A. Mason (Cockermouth) touched on the point raised by the opener of the discussion, *viz.*, the blame on the cow. Dr. Mason would like to be convinced—as would all other public health officers—that the bovine tubercle bacillus and the bovine tubercle bacillus from the cow was usually the source of tuberculosis in man, and more especially in children. He instanced a case where tuberculosis had been found in the milk supply from a farm and no tuberculosis was found on clinical examination of the herd, and all the cows passed the usual routine tests. As there was no revelation on the veterinary side, the matter dropped, and meanwhile, on further sampling, no further tuberculosis was discovered in the milk. A month or two later the medical officer of health received notification from a local medical practitioner of a case of tuberculous disease of the proximal phalanx of the right forefinger in a young man who, it was eventually found, had been milking on the farm at the time the first sampling was done.

Dr. Mason indicated he would like to make sure that human agency was not responsible, and although there was legislation to help in this matter, it was only really of use after notification of the disease in man.

Professor R. G. Linton (Edinburgh) expressed his appreciation of Mr. Burrow's paper. In considering the milk question it was necessary to know exactly what one wanted; it was this: milk reasonably clean, of a reasonably high nutritive value and definitely free from organisms pathogenic to man. Was there any reason why they should not aim at two grades of milk—certified milk and Grade A (T.T.) milk, which should go only for consumption in hotels, schools, and other institutions? The veterinary profession had stamped out that foul disease glanders, and were not going to rest content until they had ultimately eliminated tuberculosis from dairy herds. They needed help in this, and the greatest help they could get was from the general medical practitioner. Every medical practitioner who, being certain that certified milk was what it claimed to be, advocated parents giving their children certified milk did a very great deal towards helping in the ultimate elimination of bovine tuberculosis.

Mr. P. F. Dolan (Dublin) said that Mr. Burrow had stressed method on the farm. Nothing else would make up for method,and following on that line he had found that no amount of inspection or control would make up for inspection at the source—that was, laboratory control would never make up for routine inspection. On the other hand, inspection on the farm by itself was of little benefit without the aid of the work in a bacteriological laboratory. If half the amount of energy were put into milk production at the source that was shown in the cities it would be greatly to the benefit of the farmer. Did they realise the vast amount spent on machinery in an attempt to make up for the carelessness on the farm? He was totally in favour of the cooling of milk, but he said that it was carried out for economic rather than for public health reasons, and that it was possible for the cooling of milk to cloak bad methods on the farm. In a good many cases a low bacterial content was an indication of the method of cooling the milk, and not a guarantee of its freedom from the power of transmitting disease.

The Reply.

Mr. Burrow, in replying to the discussion, thanked the delegates present for the enthusiastic way in which they had received his paper. Time did not allow of a lengthy reply to all the points raised by the various speakers. Replying to Dr. Gerald Leighton, Mr. Burrows said that he felt justified in describing as " food-poisoning " any gastro-intestinal disturbance caused by ingestion of organisms along with milk. Mr. Burrow did not agree with Mr. Tweed as to the latter's method of estimating the percentage of tuberculous infection in milk; the fact that even one in a herd was excreting tubercle bacilli in the milk rendered the whole of the milk produce from that farm a possible source of danger to human health, and while dilution was a factor in reducing the degree of risk, yet any tubercle-infected milk supply was a serious menace, no matter *how* slight the degree of infection might be. Various speakers had mentioned pasteurisation and bottling of milk, and Mr. Burrow was in full agreement with those who regarded pasteurisation as purely a means of deferring the souring of dirty milk, and the bottling of milk as an imposition on a credulous public. Healthy dairy herds and clean methods of handling and distribution of milk were what were needed, and pasteurisation was likely to prove merely a veil to throw over the eyes of the public and blind them to the necessity for the elimination of tubercle-infection from the milk supply of the country.

Concluding, Mr. Burrow thanked the meeting for the honour paid to him in asking him to read a paper before them that day and for the whole-heartedness with which they had entered into the discussion.

" Exhibitors at fat stock shows have to be as careful with records of breeding and calving dates as exhibitors of pure bred cattle must be," observes the *Scottish Farmer*. " Where records are not carefully kept suspicion is aroused.

" It was rumoured that nine cattle had been turned out of the Agricultural Hall without being judged because the owners could not satisfy the stewards that the breeding was correctly stated. Other cases are being investigated. Why cannot exhibitors show fairly?

" The stewards of stock at Smithfield will stand no nonsense. They take pains to see that the rules are observed. This is just as it should be at all shows."

After having lapsed for several years, the Irish cattle trade from Cork to Bristol was revived recently, when over 400 cattle, sheep and pigs were landed.

The Blood Content of the Muscle of Pigs Slaughtered by Various Methods.

J. W. Edington, M.D., D.P.H. and A. Elliott, Ph.D., Sc.D.

Since the adoption, in many cases compulsory, of the "mechanical" slaughter of animals, controversy has arisen between the butchers and the local authorities regarding this method. The butchers point out that by slaughtering animals, especially pigs, in this manner, a certain percentage of the carcasses show a condition known as "splashing," thus greatly depreciating the value of such meat. This meat is not only unsightly but is, according to the bacon curers, unsuitable for curing.

In Sheffield, until recently, pigs were first shot by means of the captive bolt pistol and after one to two minutes (the time occupied in getting the animal out of the Schermer trap and hoisting it over the killing trough) were then bled. This method was investigated by Tweed, Clark and Edington (1931) and amongst other observations they confirmed the vascular engorgement of the muscles which was stressed by Hill and Dunkin (1924).

Mr. Tweed, Sheffield, has found the following modifications of this method satisfactory as far as the elimination of "splashing" and the collection of the blood is concerned. The pig is hoisted alive and is then shot in the usual way. It is immediately stuck before the blood pressure rises, *i.e.*, according to the blood pressure tracings in the paper by Tweed, Clark and Edington (1931) within two seconds of shooting, and this prevents to a large extent muscular contractions acting on engorged blood vessels.

Though this method eliminates "splashing" certain objections have arisen. Firstly, a certain amount of pain is suffered by the pig in being hoisted by one leg, and secondly, it is extremely difficult to get the pig stuck within the required short period of two seconds. This is difficult owing to the position of the pig and also on account of the convulsive movements which occur on shooting. With a suitable trap which would immobilise the animal and render the killing procedure easier and thus quicker, this method would be both humane and sound from an economic point of view.

Recently, another method has been introduced into this country and has now been adopted in Sheffield on Mr. Tweed's recommendation. It is known as "Muller's Method," and by it the pig is rendered unconscious by electrical means. It is then hoisted, and stuck whilst hanging over the bleeding trough. This method is most impressive in its efficiency. The animal is killed painlessly and the flesh shows no signs of "splashing." It appears ideal. Ducksbury and Anthony (1929) published investigations on the blood content of the muscles of pigs stunned by electricity before bleeding and found the blood content higher than in the muscles of pigs killed by direct bleeding.

The electrical apparatus used was the old Muller pattern and not the recent one.

They estimated the amount of hæmoglobin present in the muscles by spectroscopic means. This was done by observing the point at which extinction of the hæmoglobin absorption bands occurred. They recognise that this method is not very accurate, but mention a second one which they quote as being better. This, however, is not sufficiently described to allow us to form an opinion of its accuracy.

Two great errors are made in these experiments which render the results useless as a guide to the blood content of the muscles.

1. The estimations are carried out on hæmoglobin which is notoriously unstable, instead of on carboxyhæmoglobin.
2. The authors do not appreciate the wide differences in the hæmoglobin percentages of the various pigs' bloods.

Our present investigation concerns the amount of blood present in the muscles of pigs killed by four different methods, *viz* :—

1. Captive bolt pistol and delayed bleeding.
2. Captive bolt pistol and immediate bleeding.
3. Direct bleeding.
4. Muller's Method.

In each series twelve unselected pigs were examined. Our first intention was to compare the hæmoglobin content of the muscles, but this was found to be highly inaccurate as an index of the blood content of these muscles. This was due to the fact that the hæmoglobin percentages of the pigs' bloods varied greatly (from 80 per cent. to 112 per cent.). The results were, therefore, converted into the amount of blood present in 100 grammes of wet muscle. In these estimations the variations, if any, in the amounts of muscle hæmoglobin as contrasted with the hæmoglobin present in the blood of the muscles were neglected. We considered the following methods for estimating the hæmoglobin present in muscles :—

1. By simple colorimetric means. As the tints of the standard blood solutions and of the distilled water extracts of the muscles with which they had to be compared were quite different this method was found to be highly inaccurate.
2. By estimation of the oxygen consumption. This was not sufficiently delicate for the estimation of the small amounts of hæmoglobin present.
3. By refraction. This was, of course, useless on account of the muscle extractives, other than hæmoglobin, present in the distilled water extract.
4. By spectrophotometry. This was the method of choice, and gave excellent results.

Technique adopted in each case :—

When the animal was killed blood was collected from the throat wound for the estimation of its hæmoglobin percentage and for the preparation of the standard solution of hæmoglobin. Every pig was dressed within an hour of its being killed and portions of the musculature were taken for examination. In all cases samples were taken from the crest and loin muscles as well as from the diaphragm as it is in these muscles that "splashing" is most obvious when it does occur. Each portion was stripped of fascia and fat and the whole exterior removed lest the surface might have been contaminated with blood from some extraneous source. The muscle was cut up into small portions and then weighed. It was then extracted with distilled water until the latter came away unstained with blood. The fluid obtained was filtered, the amount noted, and, after treatment with carbon

monoxide to convert the hæmoglobin and oxyhæmoglobin into the more stable carboxyhæmoglobin, was ready for estimation.

To get the standard solution of carboxyhæmoglobin the hæmoglobin percentage of the blood obtained from the throat was estimated. This was done by means of a Haldane's hæmoglobinometer and this gave the result in terms of human hæmoglobin. This blood was then diluted 1 in 1,000 as this strength was found by experiment to be most suitable for spectroscopic comparison. Before doing this comparison this solution was treated with carbon monoxide to convert the hæmoglobin and oxyhæmoglobin into carboxyhæmoglobin. The muscle extract was then compared with the standard blood solution by spectrophotometric means, and the intensity of corresponding absorption bands in the two fluids matched.

The amount of hæmoglobin was calculated in the standard blood solution taking the amount of hæmoglobin present in 100 c.c. of blood containing 100 per cent. hæmoglobin as being 13·8 grammes. From this the amount of hæmoglobin in the muscle extract was calculated, and knowing the weight of the muscle originally taken the amount of hæmoglobin per gramme of wet muscle was ascertained. As the percentage of hæmoglobin in the pig's blood was known the weight of hæmoglobin in 100 c.c. of this blood was next calculated, and from this the amount of blood present in the pig's muscle was found.

The following example illustrates the calculations:—

Data:—Hb. per cent. = 84. Weight of wet muscle = 22·446 grammes.

Distilled water extract from the muscle = 70 c.c.

Spectrophotometric readings } Standard blood solution = 30. Muscle extract solution = 15.

Then $\frac{84}{100} \times \frac{13{\cdot}8}{1}$ grms. Hb. are present in 100 c.c. pig's blood, *i.e.*, 0·00011592 grms. Hb. are present in 1 c.c. pig's blood diluted 1 in 1,000.

Therefore there are $\frac{{\cdot}0001159}{1} \times \frac{30}{15} \times \frac{70}{1}$ grms. Hb. in 22·446 grms. of wet muscle = 0·000723 grms. Hb. in 1 grm. of wet muscle.

But 11·592 grms. of Hb. are present in 100 c.c. of the pig's blood, *i.e.* $\frac{{\cdot}000723}{1} \times \frac{100}{1} \times \frac{100}{11{\cdot}592}$ c.c. of blood are present in 100 grms. of wet muscle = 0·62 c.c.

Description of the spectrophotometer used.

Apparatus.

The solutions to be compared were contained in two similar rectangular glass cells so constructed that the thickness of the solution could be varied from 0 to 4·0 cm.; the actual value of the thickness was read off on a scale etched on the cell wall. These cells were mounted side by side in front of a lamp fitted with a diffusing screen of ground glass. One cell was about 1 cm. higher than the other. Behind each cell was a rhombohedral prism whose function was to bring the light beam coming through each cell into the same verticle plane. By means of a lens, an image of the cell faces was thrown on the slit of a spectroscope and by suitable adjustment of the rhombohedral prisms, the image of one cell could be brought immediately above that of the second cell. On looking into the spectroscope, two spectra were seen, one due to each of the two images. These spectra showed the absorption bands of carboxyhæmoglobin.

Measurements.

The apparatus being set up as above, with the solutions to be compared in the cells, the thickness of one cell was adjusted until the absorption bands appeared equally intense. Settings were made both with increasing and with decreasing thickness, and the average taken.

If c_1, c_2 be the percentage concentration of the hæmoglobin in the cells and d_1, d_2 their respective thicknesses when the adjustment has been made, then

$$c_1/c_2 = d_2/d_1.$$

To try the accuracy of the method, a solution was put in one cell, and in the other cell was put the same solution diluted with an equal volume of water ($c_1 = 2\,c_2$). The value found for d_2/d_1 was in satisfactory agreement with that of $c_1/c_2 = 2$. When beginning a new set of measurements, care was taken to adjust the apparatus until, on interchanging the cells, the same value was found for d_2/d_1. This showed that there were no appreciable errors introduced on account of uneven illumination.

The following tables give the results:—

1.—Killed by Captive Bolt Pistol and Delayed Bleeding.

Pig.	Hb. in grms. per 1 grm. of wet muscle.	Blood in c.c. per 100 grms. of wet muscle.	Hb. per cent.
1	0·002540	1·73	106
2	0·000895	0·73	88
3	0·001407	1·01	100
4	0·001241	1·08	82
5	0·000800	0·64	90
6	0·001306	0·94	100
7	0·001017	0·78	94
8	0·001431	0·96	108
9	0·001076	0·76	102
10	0·001152	0·80	104
11	0·000911	0·73	92
12	0·000847	0·63	96
Averages	0·001218	0·89	97

Pig 1 showed marked "splashing," and Pig 8 slight "splashing."

2.—Killed by Captive Bolt Pistol and Immediate Bleeding.

Pig.	Hb. in grms. per 1 grm. of wet muscle.	Blood in c.c. per 100 grms. of wet muscle.	Hb. per cent.
1	0·001093	0·84	94
2	0·000726	0·58	90
3	0·000933	0·71	94
4	0·000931	0·71	94
5	0·001007	0·82	88
6	0·001564	1·13	100
7	0·000868	0·68	92
8	0·000983	0·69	102
9	0·000873	0·65	96
10	0·001245	0·86	104
11	0·001087	0·78	100
12	0·001241	0·80	112
Averages	0·001046	0·77	97

3.—Direct Bleeding.

Pig.	Hb. in grms. per 1 grm. of wet muscle.	Blood in c.c. per 100 grms. of wet muscle.	Hb. per cent.
1	0·0008815	0·67	94
2	0·0008524	0·69	88
3	0·0007110	0·56	90
4	0·0008198	0·62	90
5	0·0009724	0·72	90
6	0·0008787	0·64	90
7	0·0006114	0·50	88
8	0·0007475	0·63	84
9	0·0006812	0·58	84
10	0·0008157	0·64	90
11	0·0006547	0·52	90
12	0·0008742	0·76	82
Averages	0·0007917	0·62	88

4.—Killed by Muller's Method.

Pig.	Hb. in grms. per 1 grm. of wet muscle.	Blood in c.c. per 100 grms. of wet muscle.	Hb. per cent.
1	0·0006052	0·48	90
2	0·0004885	0·41	86
3	0·0006959	0·58	86
4	0·0006328	0·52	88
5	0·0004352	0·34	92
6	0·0006729	0·60	80
7	0·0008644	0·63	98
8	0·0005022	0·39	92
9	0·0007917	0·66	86
10	0·0007945	0·67	86
11	0·0008622	0·66	94
12	0·0007230	0·62	84
Averages	0·0006724	0·54	88

Conclusions.

1. The blood content of the muscles of pigs killed by the captive bolt pistol and delayed bleeding is higher (30 per cent.) than of those killed by direct bleeding.
2. The blood content of the muscles of pigs killed by the captive bolt pistol and immediate bleeding was lower (14 per cent.) than of those killed by shooting and delayed bleeding, but higher (20 per cent.) than of those killed by direct bleeding.
3. The blood content of the muscles of pigs killed by Muller's Method was even lower (13 per cent.) than of those killed by direct bleeding.

Instead of calculating the percentages as one result against another, these results can also be expressed in terms of the highest finding, *e.g.*,

Taking the blood content of the muscles of pigs killed by shooting and delayed bleeding as 100.

Then that of pigs killed by shooting and immediate bleeding would be 86, and that of pigs killed by direct bleeding would be 70, and that of pigs killed by Muller's Method would be 60.

We wish to thank Mr. Tweed for the facilities afforded to us in carrying out this investigation, and also Professor Leathes for the loan of a spectroscope.

References.

Ducksbury and Anthony. *Vet. Record*, 1929, ix, p. 433.
Dunkin and Hill. *Ibid.*, 1924, iv, p. 559.
Tweed, Clark and Edington. *Ibid.*, 1931, xi, p. 23.

The Veterinary Record.
December 26th, 1931.

A Merry Christmas to all our Readers

A Modernised "Record."

In the exercise of that conservatism which remains a national tradition in respect of long-established things, many years have elapsed since any material alteration was effected in the paper, type and make-up of the Association's journal, but the advantages of modernisation are many and our readers will be interested to learn that, in connection with all these important factors in the production of a periodical such as ours, radical changes will be introduced in the New Year issue.

The process of modernisation which *The Veterinary Record* is about to undergo will enable us to provide the profession with a weekly which, we are confident, will rank high amongst professional journals in point of technical production. Printed upon paper of greatly improved quality, the type to be employed as the standard for all major contributions is an improved specimen of that hitherto reserved for our leading articles, while that to be used for subjects of secondary importance will no longer render our notes and similar matter a potent source of irritability by reason of the diminutive character of the type. The increased dignity and readability thus acquired by the journal will not be gained at the expense of the volume of material presented, which will be preserved in its present proportions by the provision of additional pages.

So great is our assurance that N.V.M.A. Members and *Record* subscribers will appreciate improvements calculated to render our paper at once more pleasing in appearance, more substantial and easier to read, that we regard the occasion as opportune to remind the profession that the most acceptable form of expression of such appreciation will be a sustained demonstration of practical co-operation with the Editorial Committee. It is not for that body alone, but also for our readers consistently to bear in mind the fact that while the achievement of a high standard of technical excellence in production must always be a matter of urgent concern, it is yet of secondary importance to the vital necessity of ensuring that the material presented in the journal, and not only the manner of its

presentation, shall be worthy of the profession. It is not for us to stress the fact that in this respect the Editorial Committee does everything within its power, but it is fitting that we should reiterate our appeal to practitioners to use our clinical section for the chronicling of their experiences in the field and to regard our correspondence columns as an ever-available medium for the ventilation of their views on the infinite variety of subjects which properly invite comment in the weekly organ of the profession.

Clinical and Case Reports.

Tuberculosis in the Horse.

F. C. Scott, M.R.C.V.S., Pontefract.

Having met an unusual number of cases of this condition recently, an outline of some of the details is rather enlightening.

Age.—Tuberculosis is most commonly met with in horses from four to eight years of age—the last case seen occurred in a 12-years-old horse, but this is unique in my experience.

History.—There is generally a negative history that the horse has not been reared on cow's milk, or no enlightening history.

Symptoms.—Probably three out of four horses showing neck stiffness, with a grunt on being turned sharply, are tuberculous and should be tested. Neck stiffness may only be discernible by making the horse feed off the ground, in which case he has to bend his knees to get his head down. Other horses show unthriftiness, stand away from their companions at grass and feed indifferently; others have a temperature round about 102·5° F. over a long period. Chronic gland enlargement in the inguinal canal, induration of the udder in the mare when non-pregnant, or at the first foaling (in the latter case there is no milk) are suspicious symptoms of tuberculosis.

Breathlessness at ease, during a journey, and not settling down afterwards, if continued (as in some cases) for months is suspicious, too; these cases at first sight appear to be pneumonia but the history generally indicates that the symptoms have been shown for a long time and are of a chronic nature. The temperature is not a febrile one.

A horse lame from patellar bursitis grunted on turning and proved to be tuberculous. Ulceration of the skin on the sheath and thighs led to a diagnosis of tuberculosis in another case.

Rectal examination is particularly useful in quite half of the cases, as the spleen, if involved, can be made out distinctly—sometimes only the posterior edge but often the actual tumours.

Once a suspicion exists, there is no need to undergo the mental stress of giving a definite opinion at this point, as the intradermal tuberculin test may be applied and in the horse its results are very definite and clear: usually the horse reacts very markedly to the sensitising injection; the size of the reaction is very obvious—anything from a small one to one 12-in. by 10-in. It is usually large, but the gravitating character of the reaction —if the injection is made into the neck—down towards the jugular furrow, is perhaps more characteristic than the dimensions. Rarely has the second injection to be made, but if there is no reaction to the first injection it must be practised: I have had two experiences during the present year where there was no reaction to the first injection and yet a very marked one after the second injection. The non-reaction in the horse is very distinct and is only likely to be confused where a small abscess is forming—I have had experience of this on two occasions, and of course definite information is forthcoming later.

If one bears in mind the non-reaction in a horse, when testing cattle, I think the comparison should make one very strict in classing a bovine reaction as doubtful.

A rare case (as to symptomatology) occurred recently, exhibiting symptoms not included in the general symptoms met with in this condition. The horse was used for shunting, and if allowed to go his own pace worked well and heavily; if pushed, he showed respiratory distress—this, being considered due to his temperament, was not in any way associated with disease for one or two years. The horse then had influenza with a deep parotid abscess, from which he recovered and worked two more years as before. A day arrived when he showed a little œdema below the chest, temperature 102·5° F., appetite ravenous. He was dull and heavy and a heart sound was noted; he showed distress at exercise, and heart disease was diagnosed and the horse put on heart tonics. A later visit was made and on turning the horse sharply he showed distress and stiffness in the neck. The tuberculin test was applied and the animal gave a reaction of 12-in. by 10-in. to one injection. Rectal examination was of no avail here as the horse was of large dimensions and weighed a ton—factors which placed the spleen out of arm's reach.

Post-mortem Findings.—The spleen is the organ most usually affected—in some cases it is the only part with macroscopic lesions. Usually, however, one finds the greater part of the lymphatic glands of the body affected to a greater or lesser degree; occasionally there is a general affection of the lymphatic glands and the spleen shows no discrete lesions.

The lung lesions, when present, may or may not be accompanied by splenic lesions; they may be localised or wide-spread: in both cases they give a more or less solid consistence to the lung tissue not easily diagnosed as tuberculosis; there is no breaking down, nor are there pus cavities as in cattle, but the lung condition is what I take to be miliary tuberculosis.

In the case described in which the horse showed heart symptoms, the spleen showed many large lesions (a typical case of what was formerly known as lymphadenoma); the splenic, hepatic, and mesenteric glands were affected with tubercle to an extensive degree. In the thorax every lymphatic gland, having a name, was extensively affected, The heart itself showed extensive lesions of the muscular tissue of the right auricle, quite recognisable by their similarity from outward appearances to the splenic lesions; the auricle when cut away from the ventricle was like a horny box, the only movement in it being over a small area on the upper part which allowed about as much movement as the tympanum of a drum; in this case the lung tissue was normal, the liver showed lesions.

Prognosis.—Once a tuberculous horse shows symptoms which lead one to suspect the disease, it is usual for emaciation to be progressive—the lung cases may live three or four months, more obscure forms six or nine months; very rarely does a horse have a period of improvement or reprieve; once symptoms commence, it is usually the beginning of the end.

I have frequently been asked, after diagnosing tuberculosis in a fat horse: Can he go on working? How long will he last?

In the udder case mentioned, there is no interference with other vital organs discernible, so that this mare may be serviceable for one or two years more.

The method of infection is, to me, an extremely interesting and speculative problem.

In three instances I have met more than one case on the same farm. In the main the history has been available, and there has been no rearing on cows' milk: in most cases only an odd cow has been kept for the farmer's use, so that it is extremely doubtful if it is contracted direct from bovines.

In one instance there was need to investigate disease amongst poultry, which proved to be tuberculosis, on a farm from which a horse had been sold and proved to be tuberculous in the hands of his new owner.

In another instance where two cases occurred on one farm, enquiry elicited the information that each year a number of fowls "went light" and died, but no investigation has been made.

It seems highly probable that the horse is affected by means of fowls which frequent mangers and pastures adjacent to the homesteads. Further investigation on this and the strain of organism infecting, is necessary before one can definitely blame birds for carrying the disease.

P.S.—Since writing the above, a lung case has been encountered where the second injection of tuberculin was made at the 72nd hour; although the result was a definite positive, the dimensions were not greater than 2½-in. by ¾-in.

Chronic Diarrhœa in the Dog.

G. Mayall, M.R.C.V.S.

There is no doubt that the above subject, about which your correspondent enquired in your issue of December 12th, causes much trouble and reflection and the adoption of various modes of procedure on the part of veterinary surgeons, and that often non-success is the end result. In any rational method of treatment it seems essential that the cause of the malady should be fathomed and this is often obscure: as Wallis Hoare in his great work indicates, it may be a catarrhal enteritis or associated with chronic affections of the heart, liver or kidneys, which interfere with the circulation in the intestinal walls and produce a condition of chronic passive congestion leading to intestinal catarrh. The affection may also depend on tuberculosis or coccidiosis—microscopic examination of the fæces may help.

In connection with the subject it may be useful to read an article which appeared in *The Veterinary Journal* for June, 1926, by Professor J. G. Wright, F.R.C.V.S., entitled "Vomition in the Dog." Worms as a cause of diarrhœa ought not to be overlooked; bad hygienic surroundings, errors in diet and fermenting food or putrid animal matter picked up may all be causes. In cases of ptomaine poisoning, vomiting and diarrhœa may both be present at one time. As regards diet, milk food in small quantity is indicated as are rice, milk or arrowroot. Lime water or white of egg may be mixed with the milk and a little brandy is sometimes given, but I am not very partial to its use.

Concerning medicinal remedies, I have perhaps had best routine results from medicinal doses of hæmatoxylin and pulv. cretæ aromat. (according to the size of the dog). Another remedy that has occasionally been successful as a last resort has been: pulv. ipecac. 80 grains, subnitrate of bismuth 40 grains, sodæ bicarb. 40 grains, syrup of orange 4 drachms, water to 2 ounces—shake well and give one or two teaspoonful doses every three or four hours according to size of dog. A procedure that has helped me and that I have not seen mentioned in any veterinary text-book is to flush the bowel out once or twice a day with permanganate of potash solution. I believe this is often done in human practice and the tip was given to me by a doctor. I always practise it now. It is most important to give any fluids (at any rate in the first stages) in quite small quantities. Arrowroot biscuits, if the dog will take them, are useful when the patient is recovering. For any dog that has become convalescent it is essential that a diet table should be written out by the veterinary surgeon and given to the owner when he takes the dog away, otherwise all the good work of the practitioner may be brought to naught; verbal instructions are often forgotten and the invalid welcomed home by dietetic acts of mistaken kindness. Diarrhœa in Alsatians has been a particular bugbear to me.

Chronic Diarrhœa.

Hamilton Kirk, M.R.C.V.S.

Referring to your editorial note in the issue of December 12th inviting comment upon your correspondent's letter concerning the treatment of persistent diarrhœa in dogs and cats—I regard this trouble as a real problem in canine practice and am not surprised at your correspondent's concern and despair. Time after time I encounter cases which at first one might consider as trivial and unimportant. Routine methods of treatment are advised, but the dog is brought back still suffering, and probably a different line of treatment is adopted. After a further day or two, diarrhœa still persists and one begins to get anxious. Often, weeks go by with no cessation of the symptom, and the owner has a feeling of dissatisfaction, whilst the animal becomes markedly weak and emaciated.

The fundamental question to be settled, if possible, is the cause, for upon that largely depends the cure. So many of these cases seem to have absolutely no ascertainable cause, the puppy or kitten remaining bright and lively and yet evacuating watery stools at very frequent intervals over long periods.

It is the great function of the colon to abstract water from the fæces and present them at the rectum in a moderately formed condition. For some reason, then, the colon fails to perform this function; or it may be that peristalsis is too active, and by driving the ingesta along

too fast, allows insufficient time for absorption in the colon.

Inflammation of the small bowel does not usually set up chronic diarrhœa, so far as I am aware, and in support of that view one might instance the case of infectious feline enteritis. These cases are not characterised by diarrhœa, but by sickness and depression.

Chronic diarrhœa does, in my opinion, often arise from some toxic infection of part or of the whole alimentary tract, such, for instance, as the infection of young animals by the distemper virus. It is not uncommon to treat puppies for two or more weeks for chronic diarrhœa alone, and to find them eventually manifesting a characteristic picture of distemper.

Intermittent or persistent diarrhœa occurs, too, as a result of intussusception, moderate or severe ulceration, tuberculosis of the bowel, carcinoma, coccidiosis, or even chronic indigestion; thus one really is faced with no mean problem in attempting to elucidate the underlying causes of some of the more obscure cases.

I have had a fair measure of success in the past from the use of intestinal antiseptics such as Dimol syrup, and at times I have thought that this was helped by the addition of liquid paraffin. Quite frequently, however, this remedy has afforded no relief, neither have bismuth and magnes. lact., nor permanganate of potash pills. The latter, in combination with small doses of thyroid extract, have sometimes seemed to have an excellent curative effect, thyroid extract having, of course, a specific action against all toxins.

The astringents, such as opium and catechu in pill form quite often are useless, as also is chlorodyne with or without bismuth; but many times I have in despair injected small doses of morphia daily with exceptionally good results. This, however, is not usually adopted except as a last resource, and the same may be said about the administration of silver nitrate pills in gr. ¼ doses. I have obtained cures by the latter method in a number of cases.

Nowadays, believing strongly in the theory that it is the colon which is the part implicated in chronic diarrhœa, I am regularly adopting colonic lavage with normal saline once daily in all cases in hospital. In some 60 per cent. of cases it has either cured or else greatly alleviated the condition.

I usually continue to feed such animals on raw lean beef devoid of gristle or indigestible fibre, with charcoal biscuit broken and fed dry.

It will be interesting to read the methods and experiences of any other practitioner who has been bothered with these cases in his practice.

Beaudette of the New Jersey Agricultural Experiment Station in 10,000 autopsies of chickens, found 2,281 cases of pullorum disease; 300 cases of fowl cholera; 53 cases of tuberculosis; 137 cases of roup; 2,094 cases of parasitic diseases; 1,078 cases of disease due to filtrable virus; and 561 due to dietary deficiencies. There were many cases in which death was due to swallowing nails which had lodged usually, in the gizzard.

The Council of the Hackney Horse Society have re-elected Mr. Alfred Mackenzie, F.R.C.V.S., as Chief Veterinary Inspector for the 1932 Show, which is to be held at Guildford.

Abstracts.

[**The Position of Veterinary Science in Australia and Abroad.** Seddon, H. R. *Aust. Vet. Jour.* Sept., 1931. Vol. vii, No. 3.]

The author sets himself to answer three questions:—Firstly, what is the attitude of veterinarians in other countries in regard to the scope of the veterinary profession; secondly, is that attitude reflected in their training, their ability and their position in the community; and thirdly, does their attitude or outlook differ from that of the Australian veterinarian? These questions he proceeds to discuss in the light of the experience gained during his visit to the Continent of Europe on the occasion of the Eleventh International Veterinary Congress.

"There are undoubtedly very able veterinarians in Great Britain," he observes, "and I have profound admiration for their scholarship. One knows also that in that country there is a spirit of conservatism, and more than a tendency not to assert one's own capability; a tendency even to adopt an attitude that may easily be mistaken, by those not knowing this national characteristic, for an assumption of inferiority."

The author was struck by the fact that to all these outstanding men attending Congress veterinary science was a *science* and not an art or profession, and that these men had a scientific rather than a professional outlook. "It must not be thought that they were all men from laboratories. Many were, but many were not. Some have undertaken considerable clinical work and still undertake it, but they have not forgotten the basic sciences upon which successful clinical work is founded, and evidence of this is gained from their contributions to discussions and from their publications. Practitioners on the Continent are probably more numerous relatively than in Great Britain, and therefore it might have been thought that the giants of the profession on the Continent would have been found chiefly in the sphere of clinical work. It is, however, by no means so."

Turning to the programme of the Congress and the extent to which clinical subjects were discussed, Dr. Seddon notes that in 28 meetings, medical treatment of disease was discussed on only five occasions, two being in reference to parasites, while at another meeting clinical diagnosis was dealt with. At one only of all the meetings was surgery discussed, and the subject of anæsthesia was not raised at all.

"Whilst it may to some extent be true that in the programme as drawn up for the 1930 Congress certain subjects of considerable interest to a large body of veterinarians were omitted, or given insufficient consideration, yet the serious diminution in discussion of the clinical side of veterinary science is significant."

The author next quotes figures given at Congress showing the *annual output of qualified veterinarians in proportion to the population*, as under:—

United States of America	1 in 120,000
Denmark	1 in 133,000
Germany	1 in 210,000
France	1 in 300,000
Sweden	1 in 275,000

Great Britain	1 in 500,000
Australia	1 in 1,000,000*
South Africa	1 in 500,000*

His comment is as follows:—

"The total population figures in relation to the number of veterinarians are somewhat fallacious, inasmuch as the majority of city and town dwellers are directly interested in only two types of animals, *videlicet*, dogs and cats. Animal population figures are likewise fallacious, for, whereas a veterinarian might be called in to attend any of the cattle in Britain (except the Highland cattle), there are hundreds of thousands of cattle in Northern and Central Australia which could be dealt with by a veterinarian only in the event of some severe plague, such as rinderpest, occurring among them, and then with a gun. Further, it has to be remembered that as stock are concentrated, so does disease increase in incidence. It is interesting, however, to note that even in countries with such a large industrial population as some of those mentioned, the number of veterinarians per head of population is much higher than in Australia, where the ratio of veterinarians graduating annually is only one-fifth of what it is in Europe, *id est*, one per million people. The *total number* of veterinarians per head of population in Australia represents about one veterinarian for every 40,000 people."

Concerning state control, "one finds that in Europe there are many practitioners, the private practitioner by far outnumbering the official (state and municipal). The same obtains in Canada and the United States of America. In Australia, South Africa and the larger colonies, *exempli gratia*, Kenya, Tanganyika, Malaya and India, the reverse is the case, the majority of qualified veterinarians holding official positions . . . . There is a need for practising veterinarians to undertake those activities which the state cannot, and to carry out such procedures as vaccination, tuberculin testing, taking of specimens for diagnosis under disease-free herd schemes *et cetera*, which, with the ever increasing demand for such activities, cannot for ever be undertaken by the state. It is to be hoped that eventually such a volume of this type of veterinary work will be undertaken by the private practitioner, that it will constitute a valuable addition to medicine and surgery and will insure an adequate remuneration to the individual."

Reverting to his main theme, Dr. Seddon argues that there is a very real need for the practitioner of medicine and surgery quite apart from those functions he may undertake in connection with state services. He is forced to the conclusion that, viewed internationally, clinical medicine and surgery do not occupy the prominent place in veterinary science that they at one time did, and that veterinary sanitary science, in the widest sense of the term, tends more and more to be the foremost phase of veterinary work. "It must, however, be carried out as a science, dictated by the principles of the sciences upon which it rests, physiology, pharmacology, bacteriology, pathology and parasitology. Veterinary sanitary science does not imply only departmental control of animal plagues. To be carried out efficiently it requires state officials, laboratory workers, teachers and practitioners. Whereas at one time the practitioner was quite divorced from state activity, the present tendency seems to be for a considerable proportion of his work to be closely identified with it. The practitioner should look on his patients not solely as patients to be treated, but should bear in mind also that he has a definite responsibility to the community as regards prevention and control of disease. His aim is, therefore, the maintenance of health rather than the treatment of disease. A veterinary service must, therefore, be backed by well-equipped and well-staffed schools, adequate research facilities, supported by scientifically minded practitioners of suitable training and assisted by a legislature which is ready to modify acts or regulations in accordance with the development of knowledge and regardless of political result."

The author asks if one can say that the veterinary schools are alive to the fact that veterinary science is a science? "The term 'veterinary art' which still appears on the Diploma of the Royal College of Veterinary Surgeons is one which but for its perpetuation in that manner would certainly disappear." An adverse comment is that, whereas in most countries nowadays the veterinary school is an integral part of a university, though a certain liaison has been established between individual British schools and the universities, so that students may take a university degree, it still remains a fact that the diploma taken by all graduates is that of an incorporated college, not part of a university and not of university status or organisation.

Dr. Seddon stresses the importance of the state function in veterinary service and observes "The result of the lack of state patronage in Great Britain is seen in the formation in Scotland of the Animal Diseases Research Association, a private association formed chiefly of stockowners who have felt the lack of assistance in dealing with animal diseases in Scotland."

While this lack of state responsibility has to some extent at least been deliberate, it is to be noted that the British have asked assistance of the state, as witness the development of the various bodies affiliated under the National Research Council. "In this movement, however, veterinary science has not benefited to the same extent as, say, medical science, chemistry or physics. Within the last year or so, however—and more substantially during my stay in England—the British Government has allocated funds to veterinary institutions and shown increased appreciation of the need for veterinary education and research, and thus it would seem that now the British veterinarian is to be placed on a footing more comparable with that of his Continental or overseas colleague." But in the period before this has been attained, some things have undoubtedly been lost, and these have resulted in (*a*) a lack of support by the population generally; (*b*) a lack of cohesion of the profession—particularly as regards education and research—each institution proceeding with a policy of its own, save for the control exerted by the Royal College of Veterinary Surgeons in connection with education; (*c*) a lack of appreciation of the effects of veterinary effort as applied to disease control, animal husbandry, or disease research by the governments of the day; (*d*) a lack of adequate maintenance for veterinary schools; (*e*) a lack of faith in the ability of veterinary scientists to undertake veterinary research and, to some extent, disease control;

*The figures for Australia and South Africa were added by the author.

(f) a lack of application of veterinary science in the field of nutrition, and to some extent in genetics."

Despite these reflections, Dr. Seddon is able to speak of the "Renaissance of Veterinary Science in Britain," which has affected veterinary research. "From it also education is to benefit, for the government has now promised a grant of £150,000 towards the rebuilding of the Royal Veterinary College. We find that one group of owners—the poultry farmers—are now seeking more help from the state, and the appointment of veterinary advisers has been required to supply a demand from sheep and cattle owners. Appointments by local authorities have increased greatly of recent years, but there is not yet that general state guidance which makes for uniformity of action.

"Accompanying these advances, some attempt has been made to develop veterinary science as a science. A few years ago a degree in veterinary science was instituted, but, be it noted, it was an addendum and the existing diploma was still preserved. Many feel that veterinary institutions might be much more closely linked to universities and the qualification made an actual degree in veterinary science. The training is certainly tending to become more scientific, and more attention is being paid to such subjects as pharmacology, biochemistry and parasitology. It is now realised that four years are too short to educate the modern veterinarian, and in order to produce a veterinarian of higher qualification than heretofore, the course is being lengthened, the syllabus added to and post-graduate training extended."

The author concludes by giving the following answers to the questions originally put.

What is the attitude of veterinarians in other countries in regard to the scope of the veterinary profession?—"In the foremost countries anything affecting animal health, to which the knowledge gained by veterinarians as a result of their training or experience may be applied, is regarded as within the scope of the veterinary profession. It includes prevention and control of animal disease, treatment of sick animals and advice on animal nutrition and animal genetics. In matters of research, the living animal and animal products are our material, though it is recognised that in some of the work, more particularly that which is done apart from the living animal, other scientists, by reason of their specialisation in chemistry, biology, physics or mathematics, can assist, and should be given facilities to do so. There is every evidence that this aim will be adopted by countries which have not yet done so."

Is that attitude reflected in their training, their ability and their position in the country?—"Yes. The fact that veterinarians in certain countries have been able to demonstrate that they are qualified to do these things, has bred in them a confidence to undertake them, and in the community a recognition that these are matters to entrust to them. To fit themselves better, veterinarians are seeking additional training, and still better training is being demanded. As this has all resulted in veterinary science being considered a need of the state, appropriate recognition is being given by the state.

"The standing of the veterinarian in the community is to a large extent dependent upon the feeling of the community of the need for his science, and feeling is relatively greater the more he has progressed scientifically and the more extended his usefulness has become. The giants of the profession are those veterinarians who regard their science as something which exists for the benefit of the state as a whole and not merely as a means of livelihood, and their reward is the knowledge that their learning is appreciated by the community."

Does their attitude or outlook differ from ours?—"No. Ample confirmation is obtainable that our aims in Australia are the same as of those abroad.

"One sees, then, that we in Australia have aims essentially the same as those held by veterinarians in other countries; we have schools which will bear comparison with any; official organisations which are in the forefront of veterinary science as it exists to-day; and members who have been well grounded in the scientific side of veterinary work. Our personnel have nothing to fear by any comparisons, provided they aim at fulfilling the requirements demanded of them. The veterinarians of the rest of the world are not content simply to go on as they are, and we likewise must develop our ability and our usefulness to retain our present standing in the realm of veterinary science. Our watchwords must be 'progress and service,' and by our actions we must live up to them."

[**Injection of Living Abortus Culture in Affected Herds and the Alleged Danger of Human Infection.** Schumann. *D.T.W.*, No. 36, 5-9-31, p. 561.]

Br. abortus has been recovered from milk, cream and cheese, showing that these products can become infected through affected animals expelling the micro-organism. Such *Br. abortus*-expelling animals are found particularly in infected herds, but occur also in herds apparently healthy. The question has arisen whether in the production of immunity by the injection of living culture, there is danger of increasing the number of these "open" cases. From observations based upon 186 herds of cattle the author thinks that this is not so, and that the presence of *Br. abortus* in milk is mostly due to the prematurely calving cow. Consequently the best way of combating this is by the vaccination of animals, which is stated to have reduced abortions from 22 per cent. to 2·2 per cent. per annum. It is important for success that the systematic injection of herds should be carried out prior to service, and that a proper system of hygiene should be observed. The danger of human subjects becoming infected with *Br. abortus* through milk and its products is regarded as trifling.

W. L. S..

[**Diagnosis of Streptococcic Mastitis.** Kiessig. *D.T.W.* No. 36, 5-9-31, 570.]

Rapid diagnosis is important in the control of mastitis in cows, and the author reviews his experience of methods such as the clinical examination, chemical aids and the bacteriological examination of the udder secretion. The clinical method is not a sure guide in diagnosing mastitis and chemical methods are liable to err in 25 to 30 per cent. of cases. Thybromol and chlorine have proved best. An accurate diagnosis can be made only by bacteriological methods.

Milk from the suspected quarter is centrifuged and the deposit examined as to amount and quality. A large

cellular content, a typical arrangement of cells, phagocytosis, long or short chains of oval organisms which stain unevenly, indicate a positive result. A negative finding does not, however, exclude infection, which can then be diagnosed only by cultural methods. Ox-flesh agar of pH 7·6 is used and the mastitis streptococcus grows as small colonies 1-2 mm. in size. They show a peculiar grey-blue colour and dull lustre. The process is usually sufficient for accurate diagnosis, but in cases of doubt recourse may be had to differentiating media, such as bouillon, litmus milk, and methylene blue milk.

W. L. S.

Review.

[**Nutrition Abstracts and Reviews.**" Vols. 1 and 2 (1931).]

This publication from the Imperial Bureau of Animal Nutrition, Rowett Institute, Aberdeen, contains three short reviews and over 1,300 abstracts of current literature, covering the whole field of nutrition research. The abstracts are grouped in six main divisions, *viz.*, technique, composition of foodstuffs, physiology of nutrition, dietetics, feeding of animals and diet in relation to health and disease. For the original worker in any of these fields this journal will afford a ready means of contact with those many papers that the research worker should read, whilst for those more generally interested in the subject of nutrition the abstracts supply an indication of current research, although it should not be forgotten that they are merely summaries and are therefore not critical of the authors' conclusions and deductions. A final section is devoted to reviews of recently published books. The three original reviews in this volume are, firstly " Nutrition and Human Welfare," by Sir F. G. Hopkins, P.R.S.; secondly " Some of the Difficulties in the Quantitative Assessment of Human Diets," by E. P. Cathcart, F.R.S.; and lastly " The Qualitative Aspects of Nutrition (with Special Reference to Farm Animals)," by J. B. Orr. The last-mentioned article is perhaps of most interest to veterinarians as it outlines diseases of farm animals due to deficiency of vitamins or salts and discourses less well-defined deficiencies and the effect of malnutrition on infectious diseases.

On the whole the printing is good, the type being readily readable and not too small. It is unfortunate that the arrangement of the abstracts into two columns leads to a rather annoying splitting up of long words in the titles of papers. The spaces between separate aspects could perhaps be reduced somewhat without greatly upsetting the reader. The abstractors themselves appear, generally, to be specialist workers in the actual field from which they abstract.

W. R. W.

Mangiarotti was able to cure ante-partum paralysis of cows by the injection of one dram of a 1 : 1,000 adrenalin solution into each quarter of the udder. The treatment was effective even in a stubborn case where the animal had twice gone down after inflation of the udder. The author attributes the effectiveness of the treatment to a reduction of the blood flow to the udder.—*Veterinary Medicine.*

N.V.M.A. Divisional Report.

Veterinary Medical Association of Ireland.*

Meeting at the Veterinary College of Ireland, Dublin.

A General Meeting of the V.M.A.I. was held in the Veterinary College, Dublin, on August 4th, 1931. The following members were present :—Professor J. J. O'Connor (President), Messrs. J. S. McCann, L. Magee, J. A. Morris, G. Hinds, J. J. Condon, P. F. Dolan, A. A. Donnelly, F. S. Ringwood, T. R. Mulcahy, J. F. Healy, R. O'Donnell, J. F. McMenamin, C. M. Griffin, J. D. Whitty, S. Conway. J. E. Kenny, P. E. Mullaney, J. J. Beirne, J. A. Flynn, J. P. Nowlan, M. J. MacClancy, — O'Leary and A. F. O'Dea.

It was announced that the minutes of the previous meeting (July 18th, 1931) would be circulated to members, and they were taken as read.

CORRESPONDENCE.

The correspondence included communications from :—

(1) Mr. A. A. Donnelly, M.R.C.V.S., Drogheda, enclosing copies of letters that passed between him and the Department of Agriculture *re* the performance by him of temporary Departmental duty at the port of Drogheda, the ultimate result of the correspondence being contained in the following letter from Mr. Donnelly dated June 6th, 1931 :—

Dear Sir,

In reply to your letter of the 3rd instant No. G 922/31 *re* occasional employment for duty in connection with the inspection of animals prior to shipment at Drogheda, the Veterinary Medical Association of Ireland has recently given instructions that no member of the Veterinary Profession is to take up temporary duty until the existing grievances of the Veterinary Officers of the Department of Agriculture are redressed. When this has been accomplished I shall be pleased to do temporary duty at Drogheda Port for £2 2s. per day.

Yours faithfully,
ANDREW DONNELLY.

To :—
The Secretary,
Department of Agriculture,
Dublin, C.17.

(2) W. B. Prendergast, 3, Alexander Terrace, Limerick (addressed to Professor Browne), making a suggestion with regard to future meetings of the Association to the effect :—

(*a*) that non-members of the Association be invited to attend at meetings held in this district;

(*b*) that provincial meetings should be held early in the day as the recent meeting in Limerick was held too late, necessitating veterinary surgeons who attended it from a distance staying the night in Limerick.

(3) Mr. F. Knight, Secretary to the N.V.M.A. of Great Britain and Ireland (July 25th, 1931), acknowledging the receipt of a letter from the Hon. Secretary regarding the grievances of the Veterinary Officers of the Department of Agriculture.

*Received for publication November 16th.

(4) Mr. J. J. Dundon, M.R.C.V.S., Chief Veterinary Officer, Limerick, regretting inability to attend the meeting and wishing it every success.

(5) Mr. V. Carroll, Ballina, apologising for absence from the meeting.

(6) Mr. A. F. O'Dea, enclosing cheque for £2 2s. (being his and Mr. O'Beirne's subscriptions to the Association for the current year).

Paper.—The President now called upon Mr. J. S. McCann (Tullamore) to read a paper, which commenced with some observations on the Tuberculosis Order and difficulties met with in carrying out its provisions, followed by a chronicle of some interesting cases and methods of treatment.

[Mr. McCann's paper, and a report of the discussion which ensued, are reproduced earlier in this issue.—Ed.]

A vote of thanks to Mr. McCann for his paper terminated the proceedings.

Bang's Disease.

A year ago the Division of Animal Industry, California (U.S.A.), formulated a plan for eradication of Bang's disease from individual dairy and beef cattle herds.

In this programme the owner signs an agreement, according to which a procedure will be followed for the ultimate purpose of eliminating the disease from the herd. The plan requires that a practising veterinarian be employed by the owner for collecting blood samples, direct assistance and advice. General supervision is given, and the blood tests are conducted free of charge by the Division. The work began actively in August, 1930, when the first signed agreement was received. After a herd passes three semi-annual tests without evidence of infection a certificate is issued designating it as Bang's disease-free.

The plan at once received approval of cattle owners from almost all sections of California, and interest in the programme apparently is increasing, as evidenced by the number of signed agreements constantly being received.

By the end of 1930 a total of forty-nine herds, comprising 5,281 animals, was included in this activity. During the first three months of 1931, or by April 1st, the figures had increased to seventy-seven herds, with 9,005 animals. The increase during the last three months in number of animals has therefore amounted to over 70 per cent., indicating the interest of the cattle industry in control of Bang's disease.—*Livestock Journal.*

For the 18th consecutive time Mr. Bertram W. A. Watney's Grade A herd of Kerry cattle has passed the tuberculin test without a single reactor. The average yield for the 32 cows in the herd for the last milk-recording year was 7,307·10 lb.

"As an agricultural and horse-breeding country Ireland is largely a self-supporting unit" (says the *Irish Field*), "and we export whatever surplus we have mainly to England, or to Great Britain, if you like it put that way. England is our best customer, as we are hers."

The gravity of the position over the spread of fowl paralysis has alarmed poultry keepers in Leicestershire so much that the Poultry Committee of the F.U. has recommended to the Executive the advisability of making the disease notifiable. When the matter was discussed by the county branch it was considered this was too drastic without special investigation, and the Poultry Committee was asked to do this. It was stated that one member had lost 7,000 pullets this season and another 4,000.

Royal College of Veterinary Surgeons.

Membership Examinations, December, 1931.

List of Successful Candidates.

(*Continued from Page* 1286.)

Edinburgh:

Class A:
Clunie, R. N.
*MacGilvray, A. J.
Riggs, Alastair
Ritchie, A. F.
Bryson, D. K.
Crawford, M. E.
Forbes, G. S.
Jack, J. D. M.
Laing, A. D. M. G.
McWilliam, James
Taylor, A. W.
Taylor, I. S. M.

Class B:
Dunbar, T. G.
Durran, Percy
Little, A. C. W.
*Wilson, W. W.

Class C:
Adamson, A. McD.
Gibson, Alexander
Graham, I. A.
Grant, A. M..
McDonald, George
Mackie, G. C.
McKinnon, A. S. M.
Munro, Christopher
Sethi, R. K.
Daly, J. D.
Fairweather, G. B.
McLaren, Ian
Mangrulkar, M. Y.
Smith, T. A.

Class D:
Harper, J. D.
Heeley, Edward
Hossack, H. W. J.
Mackay, E. M.
McVean, Hugh
Wood, E. G.

Liverpool:

Class A:
Kay, O. C. M.
Taylor, Miss K.
Cook, A.
Morton, Miss D. R.
Patchett, Miss E. H.
Tattersall, Miss M. G.
Williams, Miss P. L.
Newry, W. H.

Class B:
Hepworth, L. D.
Kelly, Miss K. G.
Luckham, H. de C.
Peace, G. H. K.
Swift, R. J. A.
Clay, Miss M. C.
Thomason-Tillemont, Miss V.

Class C:
Chadha, S. R.
De Bruyn, R.
Dalzell, J. L.
Edwardson, J.
Marginson, J. C.
Ormerod, Miss M. R.

Class D:
Burnett, Miss E. A. R.
Harvey, H. G. L.
Jenkins, D. E.
Kerruish, D. W.
Morris, J. A.

London:

Class A:
*Adams, C. S.
Addison, Miss G.
Ajiz, M. H.
Goodall, E. W.
Nicol, I. E.
Thornton, P. W. D.
Woodger, Miss E. H.
Wright, R. A.
Chesney, R. W. L.
Copithorne, Miss A. M. B.
Ham, H. E. C.
Kapur, J. D.
Le Lacheur, Miss M. J.
Twyman, Miss N.
Day, F. T.
Hudson, E. W.
Perry, V. E.
Shenton, A.
Stenning, W. W.

*Denotes second class honours.

Class B:
Ahmad, M. M.
Foster, A. E. C.
Lycett, J. A.
Morant, Miss K. M.
Thompson, C. C.
Trevor, S. L.
Turnbull, N. R.
Williams, E. P.
Ahmad, M. A.
Cooke, Miss C. M.
Leiper, J. W. G.

Class C:
Brooksbanks, N. H.
March, C. T.
Murray, Miss B. M.
Short, G. V.
Singh, Kulbhushan
West, G. P.
Gray, E. A.
Hasan, S. M.
Nixon, W. J.
Torres, M. J.
Perry, C. H.

Class D:
Bawa, H. S.
Jordan, Miss M. G.
Lock, Miss B. L.
Marshall, K. I.
Norrington, C. P.
Ottaway, C. W.
Peyton, G. S.
Speed, J. G.
Wazir, V. L.

Liverpool B.V.Sc. Examinations.

The following is the University of Liverpool, School of Veterinary Science, Examination List for December, 1931, in connection with the University Degree of B.V.Sc. :—

Second Examination: *Part I.*—Baird, J. C., with Distinction; Tillemont-Thomason, Victoire de C.C.

Final Examination: *Part I.*—Curtis, H.; *Part II.*—Sidhom, N. B.

Passed in Individual Subjects.—Curtis, H., Hygiene, etc. of Milk and Meat, Toxicology and Jurisprudence.

"Honey as a Medicine."

"During the current year we have extracted from home and foreign journals many medical opinions on the value of honey," says the *Scottish Farmer*. "We will conclude the series with one by Dr. E. Wagner, as published in the best known German bee paper, *Die Biene*. 'Honey is a very ancient popular remedy whose beneficient action is derived from the poisons of the bees which it contains. Its activity is precious against bronchial catarrhs, gastric catarrhs, hoarseness, asthma, obstinate coughs, diphtheria, anæmia, illnesses of change of life, wounds of every kind, inflammation of the eyes, scarlatina, angina, abscesses, maladies of the bladder, for every throat affection, inflammation of the pericardium, maladies of the heart in a particular manner, infections of the mouth, inflammations of the gums and conjunctival tissues, erysipelas, redness and inflammation of the skin and sores of the hands. For the cure of internal ailments it suffices to dissolve a small spoonful of honey in a glass of water and sip this in little doses during the day. For external affections the honey is applied direct by being spread out thin on a piece of lint. In cases of diphtheria it is taken non-diluted with the juice of lemon with a view to killing the infective bacteria. In all other cases it should be taken diluted. Thus very many maladies can be cured effectively and economically and even avoided by the rational use of honey.'"

Notes and News.

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events.

Dec. 28th.—N.V.M.A. Editorial Committee Meeting at 2 Verulam Buildings, Gray's Inn, W.C.1.

Jan. 4th.—N.V.M.A. Committee meetings at 2, Verulam Buildings, Gray's Inn, W.C.1: Organising Committee, 3 p.m.; Special Committee, 4.30 p.m.

Jan. 5th.—N.V.M.A. Council meeting at 10, Red Lion Square, W.C.I, 2.30 p.m. N.V.M.A. Committee meetings at 2, Verulam Buildings: Appointments, 10 a.m.; Parliamentary, 10.45 a.m.; Sub-Committee on Certificates of Tuberculin Testing, 11.15 a.m.; Veterinary Officers' and Public Health, 11.45 a.m.

Jan. 6th.—R.C.V.S. Registration Committee. Council Meeting, Victoria Veterinary Benevolent Fund.

Jan. 7th.—R.C.V.S. Examination Committee. R.C.V.S. Registration Committee; Congress Executive Committee.

Jan. 8th.—R.C.V.S. Library Committee; R.C.V.S. Finance Committee; R.C.V.S. Council Meetings.

Jan. 14th.—Meeting of the Central Division, N.V.M.A., at 10, Red Lion Square, W.C.1.

Aug. 8th-13th, 1932.—N.V.M.A. Congress at Folkestone.

Army Veterinary Service.

Movements of Officers.

Major J. Judge was posted from Aldershot to Edinburgh for duty on December 9th.

Major R. T. Smith is at present in this country on leave from India.

Major F. J. Weir arrived home from India on December 12th, and is now doing duty at Newcastle-on-Tyne.

Major W. St. J. F. Macartney, who is due to arrive home from Egypt on December 23rd, has been posted to the Southern Command; he will proceed to Tidworth on arrival for the purpose of assuming duty as Officer Commanding, Station Veterinary Hospital.

London Gazette—War Office—Territorial Army.

Dec. 18th.—Major A. B. Mattinson, o.b.e., m.c. (Res. of Off.), vacates the appointment of D.A.D.V.S. of a Division (Oct. 13th).

Personal.

Scholarship.—At the Open Scholarship Examination held at Cambridge on December 8th-12th last, J. S. Bennett, son of Ralph Bennett, f.r.c.v.s., Romford, was awarded a scholarship (£100) at Magdalene College, Cambridge.

The Late Mr. E. J. Allen.

In reference to the death of Mr. Edward James Allen, M.R.C.V.S., of 37A, St. John's Street, Bedford, which was recorded in our last issue, the *Bedford Record* says: "Mr. Allen's extensive practice and work for the Borough and County authorities took him to all parts of the county and he was well known and popular among a wide circle of friends. He was not married.

"Born at Dublin on October 29th, 1892, he was educated at St. Patrick's Cathedral School, Mountjoy School, and the Royal Veterinary College, Ballsbridge, Dublin. He served his apprenticeship under Mr. R. H. Lambert, in Dublin, and came to Bedford about 15 years ago as partner to the late Mr. P. Woolston. The partnership was dissolved later, and Mr. Allen bought another local practice. He was devoted to his work and his untiring efforts were the indirect cause of his sudden death, for he would not rest when a temporary cessation from work became imperative. During the war he was appointed Veterinary Inspector to the Regiments stationed in the town.

"Mr. Allen was a member of the Bedfordshire and Huntingdonshire Farmers' Union, and his love for animals led to his election on the Committee of the Bedford and District Canine Society. Outside his work his chief interests were in Rugby football and boxing. As a young man he played at scrum-half until an injury to his knee compelled his retirement from the game. He was also a hard-working member of the Bedford Charities Boxing Committee."

Mr. Buckingham's Effort for the Royal Veterinary College.

Mr. H. Buckingham, M.R.C.V.S., of Norwich, announces that his collection on behalf of the building fund of the Royal Veterinary College amounts to date to £560 12s. 5d. Included in that amount is £130, the proceeds of a flag day in Norwich and £15 from a flag day at Wroxham.

We heartily congratulate Mr. Buckingham on the splendid success which he has achieved by his great effort on behalf of the fund.

Horse Breeding Improvement in the Derwent Valley.

There had been a great improvement in horse breeding, said County-Councillor R. Anderson, of Mosswood, presiding at the annual meeting of the Derwent Entire Horse Association at Blackhill. Councillor Anderson added that he believed horses would yet come into their own again.

Mr. Cooper, a representative of the Ministry of Agriculture, announced that the grant would be reduced from £60 to £40 owing to the financial crisis. He also said that the Ministry were concerned at the fact that in some cases only 40 per cent. of foals were left by horses.

"The Greatest Invention."

Under the above heading "H. C. B." says, in a recent issue of the *Daily Telegraph*:—

"I like the Frenchman who has just demonstrated that one of the greatest of human deeds was the invention of the horse-collar.

"The argument goes like this. Until collars had been put on horses they could not draw heavy loads. Therefore the general availability of horse power, which ended the slavery of man as a beast of burden, depended on the forgotten genius who invented the horse-collar.

"The world knows nothing of its greatest men. But, after all, there was a genius more important than the collar inventor, and he was the man who first tamed a horse. Behind him you can see other giants of intellect—the man who found that fire could be lit, and the man who proved that seeds would grow. What are cars and 'planes to such discoveries as these? The really difficult things were done ages ago."

National Association for the Prevention of Tuberculosis.

The 18th Annual Conference of the Association will be held on July 21st, 22nd and 23rd, 1932, in the Great Hall of University College, London, Gordon Street, W.C.1. The jubilee of the discovery of the tubercle bacillus by Robert Koch will be made a feature of the Conference.

Milk Pasteurisation in Aluminium Apparatus.

It is shown that the effect of pasteurisation upon the vitamin C content of milk is less when aluminium machinery is used than when copper or tinned copper pasteurisers are employed. From the standpoint of corrosion, the position of aluminium as regards the extent of its entrance into the milk was satisfactory, 0·6 parts per million being present, as against a normal content of 0·074 parts per million.—E. W. Schwartze and collaborators (*J. of Nutrition*, July, 1931, iv, 2. Ex. *Pharm. Jour.*).

H.M. Stationery Office Publication.

The undermentioned has been published recently. Copies can be purchased through any bookseller, or directly from H.M. Stationery Office, at the following addresses:—London: Adastral House, Kingsway, W.C.2, and 28, Abingdon Street, S.W.1; Cardiff: 1, St. Andrew's Crescent; Manchester: York Street; Edinburgh: 120, George Street.

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Erratum.—For "happy" read "nappy" in Case 1 of Mr. K. A. Miles' "Three Cases of Carcinoma" recorded on page 1278 of last week's issue.

Correspondence.

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

Death and Injury by Lightning.

To the Editor of The Veterinary Record.

Sir,—Having made death and injury by lightning a pet subject or (as Mr. Pillers suggests) having a weakness for lightning, I was naturally interested in Mr. J. W. Procter's paper appearing in last week's *Veterinary Record*.

There are two points on which I differ from all the contributors to this discussion.

Firstly, I maintain that there is only one kind of lightning, namely, so-called fork lightning; this may pass, and usually does pass, from cloud to cloud, but it also passes from cloud to earth. Sheet lightning—so-called—is only a reflection of fork lightning, which is taking place many miles away. As a rule the lightning current which damages animals is only a secondary or induced current from some main discharge and, for this reason, only gives slight clinical or *post-mortem* lesions.

Secondly, there is always some lesion to show—usually a red streak of inflamed subcutaneous fascia beneath the skin, frequently unaccompanied by any markings on the skin surface.

Yours faithfully,

William S. Stevens.